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THE CHICAGO REPORT ON ELECTRIFICATION.

The committee which was appointed over four years ago by the Chicago Association of Commerce to investigate smoke abatement and the electrification of steam railroads in that city has at last made public its report. The Committee has had the assistance of competent engineers and it has thoroly studied the question of smoke abatement. Probably no such complete survey of a large city has ever before been made with respect to air pollution and its causes. The findings are authoritative and will no doubt meet with general acceptance.

With respect to the electrification of railroads, however, the report is generally disappointing. This is because the Committee has considered only complete electrification of all present steam trackage, and has given no data with respect to partial or progressive electrification. This attitude of the Committee may be justifiable when it is remembered that the subject was considered primarily from the standpoint of smoke abatement, but it does not meet the expectations of those who looked forward to an exhaustive study of the electrification problem. Any informed person could have foretold that the cost of complete electrification would be considered prohibitive. But the question of whether partial or piecemeal electrification is feasible or desirable is left just where it was before.

Operation of suburban passenger trains by electric power is generally recognized as easy from the engineering standpoint and the best paying from the financial standpoint. Two of the prominent reasons for this are density of traffic and absence of the switching difficulties met in freight yards. The Committee points out that suburban passenger traffic is responsible for only two per cent of the total dust and cinders in Chicago. But smoke abatement must begin somewhere, and if two per cent can be eliminated by a change to a system which will be profitable or can even be operated without loss, why should not this step be taken? It must be remembered, too, that the suburban roads penetrate to the heart of the city, thus affecting a large population, while certain of the large industrial plants, which are such gross offenders, confine their effects to limited sections of the city, such as South Chicago.

The Committee points out that if its idea had been to plan an efficient electrification, the estimate of cost would have been different. It is greatly to be

regretted that such an estimate was not prepared. That was what Chicago wanted; that was what it has been waiting several years for; and hence the unanimous action of the City Council in at once taking action to compel electrification is readily understood. The situation in Chicago is complicated by the vast amount of switching and freight work to be done. Many miles of unimportant track could be omitted from an initial plan, and of the 38 steam railroads involved, there are 13 which perform transfer and switching service exclusively.

In comparing Chicago with other cities, the Committee states that terminal electrification elsewhere has been incidental to other improvements. The inference would not be entirely unwarranted that if certain railroads can finance terminal improvements in which electrification is but a minor incident, the same railroads could easily finance a terminal electrification alone, but the Committee appears to take the reverse viewpoint. As a matter of fact, the railroad system which has inaugurated terminal electrification in New York and Philadelphia has begun, in connection with certain other railroads whose credit and ability to raise funds rank among the highest, the construction of a huge and expensive terminal passenger station in connection with which electrification for passenger service would seem to be a minor item of expense. Yet the Committee makes no mention of these circumstances as indicating that the present would be the most propitious time for these roads to electrify their passenger traffic, at least.

A parallel to the situation regarding electrification in Chicago is found in the earlier condition of grade crossings. Originally all of the steam railroads entered the city at street grade. About 20 years ago an ordinance was passed requiring the elimination of grade crossings. It was not strictly enforced, but represented a municipal policy in favor of safety in operation. The railroads have gradually conformed, some of them adopting grade-crossing elimination as a policy to be practiced whenever opportunity afforded, realizing that even if the direct returns did not cover interest on the investment for track elevation, there are indirect returns in the lessening of damage suits, elimination of crossing watchmen, higher speed of trains within city limits, greater freedom of train movements, longer length of trains, and other operating advantages. Similar incidental benefits of untold value would accrue from electrification.

The estimate of the Committee includes an item for the construction of a central power station. Yet this is an investment which it would be entirely unnecessary for the railroads to make, and this ten-million dollar item may be lopped off at one stroke. It is reasonably certain that any railroad desiring to electrify could purchase the necessary power on satisfactory terms from the local power company, as the Pennsylvania Railroad has done in Philadelphia.

The Committee has emphasized the fact that the railroads are not the principal culprits in the matter of air pollution, and suggests municipal action to control other sources. It appears that high-pressure steam plants are the largest producers of smoke, and that other industrial operations contribute largely to the output of dust and other solid ingredients of the dirty air. It is here that the application of electric power would do more for cleanliness than through the operation of railroad trains. These steam plants produce 44.5 per cent of the visible smoke and 19 per cent of the solids polluting the air. Metallurgical and other industrial furnaces contribute 29 per cent of the visible smoke and 64 per cent of the total solids. By purchasing electrical power the smoke production of these steam plants could be greatly lessened, and it is well known that the smoke from a large central station is less than from a number of smaller power plants, even if the air pollution from the gaseous products of combustion were not greatly lessened. Burning of coal for heating manufacturing plants and office buildings would still be required.

By utilizing electrical methods for the precipitation of dust and fumes from metallurgical and other industrial plants, these sources of pollution, which are the greatest offenders of all, could be made inocuous. The processes for accomplishing this end have been worked out and demonstrated to be successful. They have been applied principally to smelters and other metallurgical processes upon a large scale, but the time has arrived for making wider use of this established method.

With the precipitation of fumes and dust in these plants, the substitution of centrally generated power for that developed in individual manufacturing establishments and the partial electrification of the steam railroads, Chicago may take a long step in removing the sources of dirt, disease, discomfort, and unnecessary expense from atmospheric pollution, leaving household furnaces as the chief evil to be combated in a future campaign.

UNUSUAL FLASHLIGHT SERVICE.

Electrical supply dealers marketing small flashlights for the Christmas trade will do well to emphasize every novel application of these inexpensive little conveniences which comes within their purview. Until the day of the universal electric porch light, the mail carrier will find a pocket flash a real aid to more rapid and accurate deliveries, as will drivers of department store wagons rushed with holiday traffic in the late evening on suburban streets. The hotel waiter equipped with one of these little outfits increases his chances of an appreciative tip by his facility in locating dropped articles beneath the table linen. A recent accident in a lavatory illustrates the efficiency of the flashlight, even in a room provided with a good general illumination by a tungsten lamp. A watch fell against the side of the porcelain tub, breaking the crystal. The shattered glass fell into the tub and could not be seen sat-

isfactorily until a flashlight was employed, when every particle was thrown into sharp relief by the reflection and was then easily removed. In the same household a flashlight was effectively used in exploring the interior of the Thanksgiving turkey before preparing the bird for the oven. The uses of these little devices are legion, and the fact that many sizes cost considerably below a dollar complete renders them among the most acceptable Yuletide gifts.

SHORTAGE OF CENTRAL-STATION ASSISTANTS IN ENGLAND.

In the early days of electricity supply, opportunities for gaining practical experience in generating stations in England were much coveted and sought after. Stations were few, but many more were in prospect, and the chances of securing a post as "chief" were best for those who had been through the mill. In those days, and, indeed, until comparatively recent years, the chief electrical engineer was considered in a number of towns to have the first claim to the fees paid by premium pupils who came to have experience under him. Such premiums went to swell the comparatively small incomes then granted to men who were at the head of electric supply businesses—much as the waiter at a restaurant supplements a nominal salary with "tips" or gratuities. In the latter case it is merely the restaurant manager's way of transferring part of his responsibilities to the public, and in the former it was the municipal electric supply committee's way of allowing the said pupil to pay part of the salary of its engineer.

Since the premium pupil disappeared from this department of electrical activity, as thousands of assistants became necessary, the royal road to a chiefship became so congested that competition among the candidates put the post at the disposal either of the cheapest or the most efficient man. But far too frequently there occurred the exercise of favoritism, not on the part of the chief engineer, but by councillors who were in too many cases his masters. What is more human than for a councillor, who is in part responsible for the electricity undertaking and its policy, to regard the electric supply business as an excellent calling for his son to follow and the station nearest home as the best place in the world for him to pursue it?

Right up to the outbreak of the European war the competition for employment in electricity works was most keen, and as a natural result salaries to subordinate staffs were so low as to give rise to a fairly widespread organized propaganda, and favoritism was one of the grievances which the agitators had much to say about. It is most remarkable how the state of war has affected the situation. The men who were depressed because they had got into the central-station groove and could neither better their status nor profitably find other suitable employment, have now found their opportunity. Many of them enlisted in the British army or navy. Others have abandoned their particular branch of engineering service in order to enter engineering and other factories where their class of knowledge and ability is so greatly in demand. They have secured far higher salaries or wages and think that they have improved their general prospects for the future; it may be that they are right in this—time alone can show. But the result of it all is that what was not so long ago an overcrowded and to some extent underpaid calling now fails to draw anything like the requisite number of men.

Various measures have been, and are being, resorted to for meeting the serious problem that the understaffing of an electric light and power undertaking inevitably involves. The Government has been appealed to to prevent men from leaving this class of duty in order to take up work in engineering factories. They will probably yet find it necessary to do so, for the simple reason that electricity is the life-blood of an industrial community and it is to the maintained activity of industrial communities in all belligerent countries that the fighting forces look for the wherewithal to do their mutual killing.

One of the London municipal electric supply authorities (Marylebone) has before it just now a scheme of apprenticeship which is designed to overcome the difficulty experienced in retaining its subordinate staffs. It is proposed to admit a number of apprentices who, after a period of probation, would be indentured. Youths of fifteen years of age and upwards would in such a way be given facilities for gaining what is described as a thorough training in the various branches of the department's work. It is thought that after the first year's training they would gradually become useful and that towards the end of their period of apprenticeship they would be able to fill responsible positions. The difficulty of retaining "improvers," and the troubles recently experienced in running the station, may by this means be removed. During their apprenticeship the apprentices would be given every possible facility for attending evening classes at schools and technical colleges. A small progressive wage of from $1.25 per week to $5 per week would be paid and a watch will be kept for those who show special intelligence and ability fitting them to serve on the permanent staff.

It will be gathered that the effects of such a scheme can only be felt in the somewhat distant future; the immediate relief afforded will be very slight indeed—it may afford none at all because of the objection that naturally lies against the presence of too much uninitiated assistance in electrical work. But it represents an attempt to deal with what is an increasingly difficult situation in England. Those who have advanced it have doubtless not overlooked the possibility of it failing to commend itself to the mind of organized electricity works staffs who have remained at their posts, or to that of those who may at the end of the war desire to return to their former electrical surroundings.

Electroplating Bronze.

The electrodeposition of bronzes has been a difficult problem, but in a recent issue of *Zeitschrift für Elektrochemie*, W. D. Treadwell and E. Beck tell of successful experiments. A suggestion by Kreeman to dissolve copper and tin in caustic alkali, adding potassium cyanide and tartaric acid did not prove successful. Some similar baths answered, however—a great deal depends upon apparently unimportant features in such researches; but they experienced in the first instance unexpected difficulty in effecting the alloying of the two metals copper and tin to bronze. They deposited thin alternating layers of copper and tin, each 0.01 millimeter in thickness, from oxalate solutions on rotating cylinders of platinum, which they then heated to 230 degrees centigrade—that is, nearly to the melting point of tin, which is 233 degrees. The two metals did not appear to alloy. To obviate the possibility of an oxidation they heated a copper tube, on which copper and tin had similarly been deposited, in an atmosphere of carbon dioxide to 275 degrees centigrade for several hours, without obtaining an alloy; and when iron, similarly coated, was heated in CO_2 up to 500 degrees for eight hours, there was hardly any appearance of bronze formation. The alloying of copper and tin would thus appear to be far more difficult than that of zinc and tin. That may partly account for the difficulty of the electrolytic deposition of bronzes.

In ordinary solutions the deposition potentials of copper and tin differ by about 0.5 volt. The difference can be reduced by suitable additions to the bath, and the addition of cyanides, in which copper forms complex ions, seemed advisable. But Treadwell and Beck found baths of copper and tin, dissolved in caustic potash and potassium cyanide, ineffective.

Good bronze deposits were obtained by mixing two solutions, the first containing 50 grams of copper sulphate, 104 grams of potassium cyanide, and 70 grams of caustic potash, the second containing 82 grams of tin-potassium chloride and 37 grams of potassium oxalate, the whole diluted with water to make up two liters. These baths gave a reddish bronze deposit on cylindrical cathodes of platinum rotated at 1,000 revolutions per minute; the anode was a cylinder of platinum gauze, and the bath was kept at 40 degrees.

Another bath yielded a golden bronze. This bath was prepared by dissolving tin in caustic potash (or potassium carbonate) and sodium sulphide, and suspending cast anodes of bronze (80 parts of copper, 20 parts of tin) in the solution. On prolonged electrolysis the deposit became reddish in color, because the tin turned passive, so that relatively more copper was dissolved from the anodes, unless the tin solution was replenished. The two bronzes adhered well to platinum, copper, nickel, iron, steel, and even cast iron; they looked homogeneous at a magnification of 500 diameters, and free from pores; at some spots, however, a concentric texture was noticed, due apparently to hydrogen bubbles. The cathodes had always to be rotated.

Topeka to Have Electric Show.

The first electrical show ever staged in Topeka, Kans., will be put on January 17 to 29, 1916. The show will be held in conjunction with the Mid-Winter Exposition in the Auditorium.

The Mid-Winter Exposition has been an annual show of the manufacturers and local merchants for the last ten years and has always enjoyed a very fine attendance. The addition of the electrical feature is going to be a great attraction, it being the first show of the kind ever held in Topeka. Detailed information can be secured by addressing R. B. Basham, general contract agent of the Topeka Edison Company.

Extension of Louisville City Limits.

Electrical contractors, the Louisville Gas & Electric Company and other interests which would be affected have been much interested in definite projects which have been published in Louisville for a comprehensive city annexation ordinance, which would extend the boundaries of the city about a mile in all directions from river bank to river bank. This would call for elaborate extension of the electric lighting systems, would extend the area over which the city building code applies and would call also for extension of the lines of the Louisville Railway Company. That an annexation ordinance will be pushed in the near future is assured, although it is doubtful whether as ambitious a program as that supported by the real-estate men will be attempted. It is probable that a considerable area will be added to the city, there being a number of thickly settled sections lying just outside the limits.

Chicago Electric Club.

At the meeting of the Electric Club-Jovian League of Chicago on December 2, W. T. Brown delivered an interesting address on New Mexico. The talk was illustrated by stereopticon views.

The Jovians assembled at this meeting elected E. W. Donoho first Tribune and J. C. Manley, second Tribune, for the ensuing year. The election of officers of the club was held December 9.

Program for Meeting of Western Inspectors.

The eleventh annual meeting of the Western Association of Electrical Inspectors will be held at the Hotel Sherman, Chicago, Ill., January 25, 26 and 27, 1916. The opening session will be held on Tuesday at 10 a. m., when reports will be made and the presidential address delivered. At the afternoon session the following addresses will be made: "The Legal and Ethical Responsibility of the Electrical Inspector," by Leon Hornstein, assistant corporation counsel of Chicago; "The Electrical Safety Code," by E. B. Rosa, of the Bureau of Standards; "Fuses, the Electrical Safety Valves," by H. E. Clifford, professor in Harvard University.

At the session on Wednesday morning, grounded fixtures and concentric wiring will be discussed. The latter subject will be treated from the standpoint of the central station by R. S. Hale, chairman of the N. E. L. A. Committee on Wiring. Other speakers will be selected to represent the contractors' and the manufacturers' views. In the afternoon there will be a discussion of selected inspectors' problems.

Thursday will be devoted to committee reports and Friday to inspection trips. On Tuesday evening there will be an informal dinner, on Wednesday evening a theater party and on Thursday evening a banquet.

Radio League Organized.

The Radio League of America has been organized with H. Gernsback as manager, 233 Fulton Street, New York City. Its purpose is to promote wireless telegraphy and telephony among amateurs. There is no membership fee or dues, but members must be citizens of the United States and own sending or receiving stations. They must pledge observance of the Wireless Act of 1912, and willingness to place their equipment at the service of the Government.

W. H. G. Bullard, Reginald A. Fessenden, Lee de Forest and Nikola Tesla are honorary members. The League has adopted an official button and issues certificates of membership without charge.

Nobel Prizes.

Earlier reports of the award of the Nobel prize in physics for 1915 have been contradicted by more recent dispatches stating that this honor has been bestowed upon W. H. Bragg and his son, W. L. Bragg, of England, for their work in investigating the formation of crystals by the use of X-rays. The importance of this work was pointed out in an editorial in the issue of December 5, 1914.

Industrial Power Series—Article No. 147

ELECTRICITY IN PUMP MANUFACTURE.

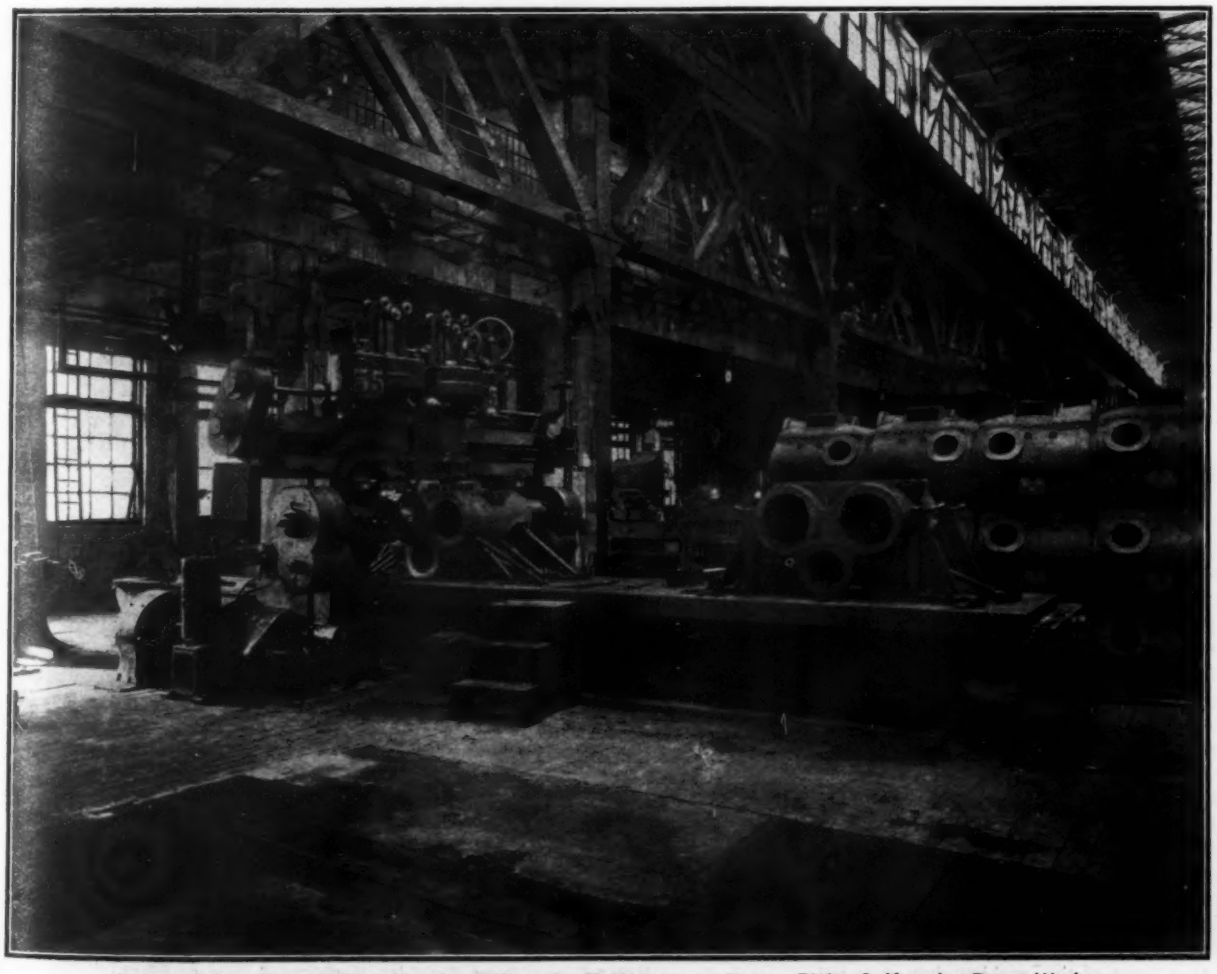
This article presents data on the use of electric motors in pump manufacture, specific information being given on two typical installations, one at Seneca Falls, N. Y., and one at Cambridge, Mass.

Within the last few years electric power in manufacturing establishments has become the rule rather than the exception, as it is realized that there is no problem of more vital interest to the manufacturer than that of obtaining a cheap, reliable, simple, and continuous source of energy. This question is often the dominating factor in determining the location of a manufacturing plant.

There are many well-lighted, well-ventilated and easily accessible locations for shops and factories which would serve admirably for manufacturing purposes if power facilities were at hand. The electric motor sets aside the limiting features entirely and affords 24-hour service.

With the electric motor deriving its energy from a central station, there is a great deal of flexibility in the matter of power. All of the customers are never using the maximum at the same time and pay only for the actual energy used. Take the case of a circular saw the power demand of which, under maximum working conditions, is five horsepower. If the manufacturing is of such a nature that the saw is used but intermittently, then where electric motor drive is used, electric energy would be charged for only in proportion to the work the saw performed. This argument applies to machinery of all classes. It is immaterial whether the manufacturing is carried on in the basement, first, second or third floors, one place is as acceptable as another for electric power. Where mechanical power is used, the manufacturer is dependent on the operation of an engine with the attendant shafts and belts. If any of these elements give out work must be suspended until repairs are made.

In the case of motor-driven machinery the problem is entirely different, as central-station service insures continuity of service. Another feature to consider is that the preparation of raw material in many industries occurs only through a part of the working day, and where mechanical drive is employed, long shafts and belts must be operated uselessly for the other portions of the day. When such conditions exist it is difficult to de-



Ingersoll Four-Head Milling Machine Driven By 35-Horsepower Motor—Blake & Knowles Pump Works.

termine whether the machinery is working at its best advantage or not, and whether there are any undue friction loads developing. With motor drive it is easy to determine from time to time the amount of power consumed when the machines are running light, and if this amount shows a perceptable increase at any time it indicates at once that there is undue friction which can be easily located and the necessary alterations or repairs made. This in itself is a valuable feature of electric drive, as it is often the means of discovering the abuse of the machines by the operatives.

The flexibility of motor drive is of great advantage as there is hardly a shop where frequent changes are not made by installing new machinery or changing the location of existing machinery. When such machinery is motor driven the change is easily made. The practicability of motor drive is now so well established that a great many concerns formerly tied down to disadvantageous and unhealthful conditions are adopting electric power, thereby enabling them to enjoy light, air and locations easily accessable to their customers.

Rumsey Pump Factory.

An excellent example of an electrically-driven manufacturing plant is that of Rumsey & Company, Limited, of Seneca Falls, N. Y. Although not as extensive as some plants, the buildings and equipment are new. There are six buildings devoted to the manufacture of hand and power pumps for all purposes, lift and force pumps, hydraulic rams, rotary and centrifugal pumps, triplex water pumps, etc. The main machine shop is 100 by 310 feet in dimensions with the other buildings somewhat smaller. Service is furnished by the Empire Gas & Electric Company from its three-phase, 60-cycle, transmission lines and all motors operate at 220 volts. The motors, eleven in number, are the squirrel-cage type and are all mounted on the floor with the starting devices on a panel adjacent.

In the foundry there is a 35-horsepower motor driving a Sturtevant No. 7 blower for the cupola, and a 6-by-6-inch air compressor. The compressor furnishes air to pneumatic hoists in the foundry proper.

From the foundry the castings are transferred to the grinding department where they are tumbled to remove the sand, and the burrs and irregularities ground off. The machinery equipment consists of three tumblers, three emery grinders, two pipe-threading machines and a 36-inch exhaust fan for removing the dust from the tumblers and the grinders. These machines are group driven by a 25-horsepower motor with an eight-inch pulley which operates at 1,200 revolutions per minute. The machine shop building is divided into several departments for work on different types of pumps, while other parts of the machine shop are used for general work for all classes of products. The work carried on is of a general machine character employing planers, drill presses, shapers, lathes, etc. One department is devoted to testing power pumps and is equipped with a line shaft and pulleys driven by a 35-horsepower motor operating at 1,200 revolutions per minute and equipped with an eight-inch pulley. With this arrangement several pumps can be tested simultaneously.

Motor Driving Group of Machines in Rumsey Plant.

In the brass department all brass work is machined and it has an equipment of nine brass-finishing lathes, one metal saw, a tool grinder and a drill press. The machines are group driven by a 15-horsepower, 1,200-revolution-per-minute motor with a 10-inch pulley. The carpenter shop is principally used for the manufacture of export packing cases. As the works are entirely new it was possible to lay out the buildings to the best advantage for electric drive.

Several of the accompanying illustrations show views in this plant.

Blake & Knowles Pump Factory.

Another interesting plant is that of the Blake & Knowles Steam Pump Works, at Cambridge, Mass., which is a division of the International Steam Pump Company of New York, perhaps the largest concern in this line of business. The Cambridge factory covers more than a block, and between 1,000 and 1,500 men are employed.

The original motive power used in operating the machinery was derived from an isolated steam plant. Energy was ex-

Motor-Driven Brass-Finishing Machines at Rumsey Plant.

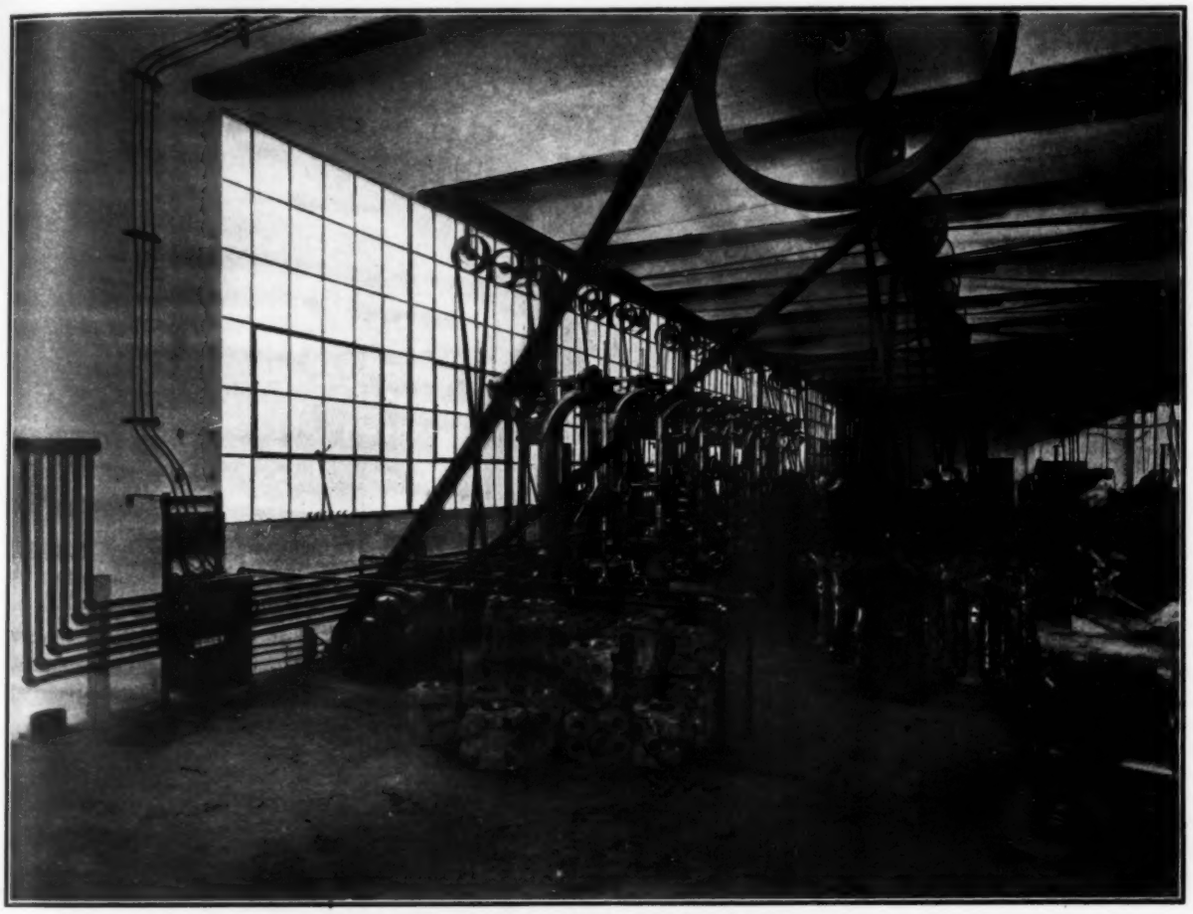
erted by means of four shafts which ran the length of the main machine shop, which is 500 feet long and 100 feet wide. Though the shafts were in several sections joined by couplings, this type of drive involved great waste of power, as whole lines of shafting often had to be kept running to operate a few machines which were in use in performing some minor repair work which required overtime operation. The friction load, of shafts, belts and pulleys alone, consumed more than 100 horsepower, and the shafts, belts, etc., caused the loss of much valuable space.

A step in the direction of efficiency of power application was made when the company installed a generating plant for a part of the works. This was one of the earliest electrical installations for power purposes in New England. A Thomson-Houston generator, of 82-horsepower capacity, which originally furnished direct-current energy sufficient for the operation of a whole shop, is now operated as a motor for driving the machines in the buffing and cleaning rooms. Though the machine is about 25 years old, it still gives efficient service in its altered duty.

The company still retains a direct-current generating equipment for a part of the works. There are 1,000 horsepower in boilers, for all uses, and generators of 350-kilowatts capacity installed in the power plant on the works. On this service are operated about 350 horsepower in direct-current motors, mainly on machine tools, cranes and hoists. One of the cranes, said to be the earliest built in New England, is still running with its orignal motors. There are in all 14 Sprague hand-operated hoists with motored carriage, each equipped with a two-horsepower or five-horsepower direct-current motor and used for transferring iron molds from the jarring machines to the foundry floor, and vice versa.

The main machines shop is on central-station power service. Four 100-kilowatt transformers and cutouts belonging to the Cambridge Electric Light Company, the company supplying the works, are located on a framework structure just outside the building. Lines enter through a double rubber cable in conduit to a fuse block, passing thence to a 1,000-ampere oil switch, thence to two panels, whence the circuits lead off in conduit as far as the space between the girders of the second floor or gallery level. The wiring from this point is open weatherproof construction.

Fuse boxes are located at gallery level, each one behind a small door in the wooden fence surrounding the gallery. Each door is numbered corresponding with that of the motor to which the line runs. The boxes contain starting fuses, which call for about three times the capacity of the running fuses at the starting compensators, with which each motor is provided. Later installations are, however, equipped with overload relays. In case of a fuse blowing, when the motor is started, the trouble is quickly traced and the fuse renewed without the attendant having to climb to any place that is difficult of access.



Battery of Boring Mills Driven by 35-Horsepower Motor.

The problem, on changing over from mechanical drive about four years ago, was how to apply the motors to best advantage to existing machines. In the case of the smaller metal-working machines, such as lathes, automatics, etc., the plan adopted was to group several units which would give as good a load-factor as possible and still be in convenient locations in relation to one another. Each group was connected to a counter shaft driven by a motor installed in an inverted position from the beams of the gallery, or over the gallery, or wall columns. All the motors operated on alternating current are of 550 volts, three-phase.

The motors which operate the lathes, etc., by group drive are of 3 to 20 horsepower each. The larger machines, such

as boring mills, lathes, etc., are located on the ground floor. There are four boring mills, one of 8-foot capacity. A characteristic of these machines is that they require a much larger amount of power to start with their load than would be necessary or practicable for continued operation, once started.

There being not sufficient starting torque in the motor, a double-length pulley was applied to each of the motors, and on the counter shaft the loose pulley and the tight pulley of the steam-drive days was utilized, the practice being to start the motor free on loose pulley, and after it has come up to speed, to throw the load on. In this manner, a motor perhaps one-third smaller than could be used to advantage otherwise is made practicable.

Another device to economize power and gain efficiency is the location of a 36-inch heavy flywheel on the counter shaft of a 54-inch Pond planer, between the motor pulley and that for the machine. By this means the reversing motion of the planer is taken up and the motor relieved of strain at the moment of reversal of the planer bed. This involves a power exertion of about three times the normal power requirement for running the machine itself. The flywheel in this case permits of a smaller motor.

Other large machines in the shop that are individually motored are a Blanchard grinder, which is driven by a 25-horsepower motor, and an Ingersoll four-head milling machine, which is direct-geared to a 35-horsepower variable-speed motor with drum control. In the foundry is a 75-horsepower induction motor which operates a Root cupola blower which furnishes air to the blast furnaces. In order to give variation to the air supply, necessary to proper furnace operation, the motor was specially built to give two speeds by means of a pole-changing switch mounted on the motor frame. In the foundry are also two motor-operated jarring machines, others being operated by compressed air.

The jarring machine is a table on which the casting box is set, filled with foundry sand with the mold in the bottom of the box in an inverted position. The sand must be compacted closely around the mold, and to do this the table is violently shaken up and down by a mechanism consisting of gears located underneath. The electrically motored tables are each equipped with a 10-horsepower alternating-current motor installed in a concrete pit about 6 by 4 by 2 feet deep. A reducing gear is located in a metal chamber between the motor and a friction clutch which is connected to a lever protruding through the floor beside the table and with which the operator controls the speed of motion of the machine.

As a means of protection to the brushes of the motors located on the floor, in the machine shop, the company had them constructed with a guard having slotted openings sufficiently close to prevent a wrench or a 1-inch bolt falling through onto the mechanism.

Three cranes operate over the whole area of the main machine shop floor. One, a Toledo five-ton crane, was designed for specially rapid transference of castings and parts to and from the boring mill, planers, etc. Its carriage travels 400 feet per minute and its hoist 75 feet per minute. The bridge motor is of 22 horsepower and the hoisting motor is of 37 horsepower.

Three traveling cranes are operated in the main foundry—two 10-ton and a 20-ton Morgan with an independent hoist of 5-tons capacity. In the store house is a 10-ton Case crane and in the erecting shop a 25-ton Shaw crane with auxiliary hoist.

The company builds air compressors, and vacuum and power pumps, in many cases with electric motor drive attached to the frame.

There are in all about 600 horsepower in alternating-current motors on Cambridge Electric Light Company service, in the Blake & Knowles works. The maximum power load is about 300 kilowatts.

Woodworking Department at Rumsey Plant.

Motor-Driven Jarring Machine, Blake & Knowles Plant.

Motor-Driven Grinder, Blake & Knowles Plant.

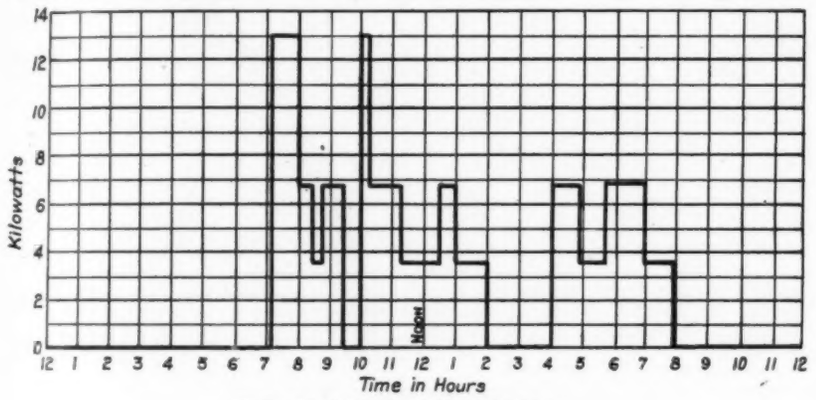
Commercial Practice
Management, Rates, New Business

ELECTRIC BAKING DEMONSTRATION AT SALT LAKE CITY RESULTS IN 12 INSTALLATIONS.

Data on Operation Indicate Economy of Electric Method.

Several months ago the Salt Lake office of the Utah Power & Light Company became convinced that there was an excellent field in its territory for electric bake ovens. Accordingly a 36-loaf oven was secured from the Hughes Electric Heating Company of Chicago, with the intention of trying oven. The power company recently installed a recording watt meter on this installation and kept a record of the maximum demand and consumption daily. The accompanying illustration shows a reproduction of the load chart of an average day for this installation. The following is a summary of the results secured between October 7 and 24 while the recording instrument was in use:

Connected load, rated	12 kilowatts
Maximum demand during period	13.4 kilowatts
Average maximum demand	13.2 kilowatts
Average daily consumption	65.67 kilowatt-hours
Load-factor for period	20.40 per cent
Load-factor for the 13 hours in use	38 per cent



Daily Load Curve of Electric Oven.

it out and learning what merits, if any, electric baking had over the ordinary method. Early in April the central station succeeded in having this oven installed for a demonstration on the sales floor of the United Grocery Company, who were making at that time a special demonstration of flour, cake and other baked products. While the oven was installed there, several of the bakers and restaurant operators were taken to witness its operation. Mrs. Walden, in charge of the delicatessen department of the United Grocery, who had charge of the demonstration, spoke in the highest terms of the work done by this oven. C. A. Shay, proprietor of Shay's Cafeteria, on the strength of these demonstrations, ordered a 72-loaf oven for use at his cafeteria. This installation has been perfectly satisfactory, Mr. Shay stating that the electric oven had cost him 20 per cent less to operate than the gas oven, which it replaced, and that he is able to turn out more products with his electric

The average weekly output of materials during the period covered by this test is as follows:

700 pies.
40 loaves nut bread.
200 loaves white bread.
36 loaves rasin bread.
38 cakes, 1-layer, 10-inch diameter.
37 cakes, 1-layer, 8-inch diameter.
270 pounds chicken.
100 pounds veal.
160 pounds pork.
10 dozen cream puffs.
10 dozen patties.
52.5 dozen rolls.
17.5 dozen discuits.
14 pans bread.
16 meat pies.

The results of the demonstration also convinced George Mueller, of the Royal Baking Company, of the superiority of electric baking and he ordered a 60-loaf oven for use in his pastry department, which was installed in June. This oven has been so satisfactory that he has ordered another 36-loaf oven for use in the cafeteria kitchen for roasting meats and another 120-loaf oven, to be used in the pastry department. He states that if this latter oven proves to be what he wants, as to size and arrangement, he will order a duplicate of it which will make four ovens, aggregating a connected load of 42.5 kilowatts when the installation as now contemplated is completed.

Several other ovens were sold shortly after as a result of the success of the first installation, including a 60-loaf capacity for Hart's Lunch Room, one for Spary & Mehse, one for the Package Grocery, one for the Palace Market and one for the Consolidated Grocery Company.

Since the demonstration was made, the United Grocery Company has purchased two 36-loaf Hughes ovens and is preparing to make an installation which will be the finest advertisement for electric cooking and baking which it could possibily receive. These ovens will be located in a special department on the sales floor of its store and all of the pastry, cake and other products sold in the delicatessen department will be prepared and baked in the electric ovens in full view of the patrons to the store. The company intends to make a special feature of the fact that its products are better because they are baked electrically. The store is now being remodeled to accommodate this department. Herewith is a tabulation of the consumption by months of the bake ovens now installed in Salt Lake City.

It will be seen that these ovens afford a highly desirable character of load and produce a most satisfactory revenue. Four installations now being made are not included.

Name	Capacity in Loaves	Maximum Demand, Kilowatts	Average Daily Hours	Kilowatt-Hours Consumed May	June	July	Aug.	Sept.	Oct.
Royal Cafe	60	9	9	.....	257*	742	813	1139	1215
Royal Baking Company	36	4.5	9	.....	.....	.....	.....	.....	*197
Shays Cafeteria	72	12	13	1072*	2056	2058	1846	2039	2101
Harts Lunch Room	60	9	13	.....	.....	†1770	1759	1713	1402
Sparey & Mehse	60	9	11	.....	.....	375	1533	2105	2005
Package Groceries	60	9	9	.....	.....	.....	.....	*401	1512
Palace Market	60	9	9	.....	.....	.....	.....	.....	1625
Consolidated Groceries	60	9	—	—	—	—	.....	.....	1130

*15 days. †9 days. ‡25 days.

Value of Domestic-Appliance Load to the Central Station.

In a paper which W. M. Stearns, of Pittsfield, Mass., presented before a recent convention of Southern central-station men on "Electric Heating Devices," considerable interesting data were given on the value of the domestic-appliance load to the central-station company and many valuable suggestions were made relative to increasing the revenue from this source.

Tables I and II show the energy consumption and income from household appliances which was obtained by means of graphic meter charts in two residences at Rochester, N. Y. These cases are not special but simply show how a load can be built up by interesting people in these devices.

This is the kind of business that is available on every lighting circuit in the country and can be readily capitalized by the aggressive central station to a larger extent than heretofore. The revenue derived from heating appliances has even provided the means of offsetting a reduction in rates which meant a decrease of $50,000 a year income to the company.

While other household devices are not used as much nor for as many hours as the flatiron, nevertheless, many of them are in service every day of the week and thus provide additional commercial value to the distributor of electrical energy. By the extensive use of heating appliances, the central station can gradually approach the ideal condition of minimum peak and valley loads.

It has been truly stated that, "it is well to remember in this connection that there is no lighting circuit appliance on the market of too small current consumption to be handled and pushed, so long as it can be relied upon to give satisfactory service to the user."

Sales Factors and Methods.

There are three fundamental factors involved in all appliance sales which receive the consideration of all companies, viz.: (1) selling profit, (2) current consumption and (3) service. The average central station usually considers only the first two factors of these important essentials and the prevailing tendency is to overlook the excellent opportunity to render complete and satisfactory service to the customer regardless of initial profit or load effect. A no-profit appliance which would not appreciably alter the station output often provides the means of furnishing complete satisfaction to the consumers, helps to make electric service indispensable, demonstrates the inherent advantages and encourages the demand for other electrical appliances which will be more profitable from both a merchandising and operating standpoint. This introductory outlet should not be overlooked in favor of those appliances which insure immediate returns.

Many of the sales methods which have been found successful for other kinds of merchandise continue to be used with good results to promote the sales of heating appliances. The most popular methods include special reduced prices for limited time, group sales whereby several appliances are sold for less than the aggregate value of the individual devices, rebate coupons, premium offers, free-trial propositions with time or installment payments and the sale of a new appliance in consideration of the return of an old device plus a nominal cash payment.

When special campaigns are conducted whereby appliances are sold at reduced prices the co-operation of the local contractors and supply dealers should always be secured. The dealers depend upon retail sales throughout the year whereas a special campaign lasts for a limited time only and a satisfactory sales policy should be adopted which will ensure harmony and result in mutual benefit to all. In some instances it is advantageous to have a special campaign handled exclusively by the dealers. Also, it is sometimes necessary to give the dealers the benefit of the purchasing power of the central station.

Reduced-Price Campaign.

One central station reports that very satisfactory results have been obtained by selling all current-consuming devices at list prices except when special campaigns are being conducted. The special reduced prices obtain for a limited time only and no difficulty is experienced in increasing prices after the special sale. Such campaigns invariably stimulate business so that subsequent sales are very much greater than those made prior to the special reduction.

Arrangements are made with the local dealers to sell at the same prices during the campaign by reimbursing them for the difference between the list and reduced prices on sales made to customers of the operating company.

Free Renewals of Flatirons.

Consistent with the policy of greater service to the customer, the central station referred to above has adopted a system of free renewals of flatirons which has greatly stimulated sales. A customer who brings in a defective flatiron is immediately given another iron which need not necessarily be a new one but in operative condition. This pleases the customer, not only because he is spared the expense of repairs but also because there is no delay, and the central station incurs no loss of revenue.

Appliance-Repair Department.

Obviously, central stations obtain more profitable results from the daily current consumption of heating appliances than from their initial sale. Realizing that an appliance load cannot be maintained at its maximum value if the devices which have been sold are allowed to become inoperative some companies now conduct a department which furnishes repairs and renewals free of charge to the appliance customer.

Many devices which might be left unused are again made revenue producers. Another advantage of this practice is that customers are convinced that they will be well repaid for investments in electrical apparatus as their devices will not be allowed to become useless. This method of handling repairs works to the advantage of the customer, the dealer and the manufacturer.

In connection with the repair of electrical appliances by central stations, a very interesting letter was received from a customer of one of the large public service corporations. He writes as follows:

"I have in my house one household utility motor, one vacuum cleaner, four electric flatirons, five electric heating pads, two electric stoves and one electric toaster.

"Of all these appliances, the only one in use at the present time is one small

TABLE I.

	Percolator, 550 Watts, Hours and Minutes	Washing Machine, 220 Watts, Hours and Minutes	Vacuum Cleaner, 325 Watts, Hours and Minutes	Flatiron, 625 Watts, Hours and Minutes
Sunday	0 22		0 58	
Monday	0 25	4 16	1 8	
Tuesday	0 16			
Wednesday	0 17			3 43
Thursday	0 22			
Friday	0 30			0 47
Saturday	0 20			
Saturday night	0 23			
Summary—				
Hours per week	2.75	4.250	2.10	2.50
Kw.-hr. per week	1.51	0.935	0.68	2.81
Cost per week*	$0.121	$0.075	$0.054	$0.225
Cost per month*	$0.540	$0.300	$0.220	$0.900

Total bill, lighting and appliances	$2.96
Income for lighting	1.00
Income for appliances (66.2 per cent of total)	$1.96

*At 8 cents per kilowatt-hour.

electric flatiron which is used in the sewing room at the top of the house.

"I am interested in this subject not only because of the investment I have in these electric appliances, but also because I am a considerable holder of securities of electric light and power companies and have something to do with directing the policy of a number of companies. I am wondering if the companies in which I own stock have as large a percentage of unused appliances as is shown in my own house.

"I think that one reason that electric appliances are not used in my house is that the servants are afraid of electricity, are afraid to use appliances when they are not working properly and in such cases simply turn off the switch and put the appliance in a closet from which it may not emerge.

TABLE II.

	Percolator, 400 Watts, Hours and Minutes	Toaster, 500 Watts, Hours and Minutes	Washing Machine, 200 Watts, Hours and Minutes	Vacuum Cleaner, 110 Watts, Hours and Minutes	Flatiron, 550 Watts, Hours and Minutes
Sunday	0 54	0 13			
Monday	0 25	0 9			0 51
Tuesday	0 37	0 28	0 79		0 14
Wednesday	0 46	0 30		0 6	
Thursday	0 33	0 19			0 21
Friday	0 51	0 24	2 10	0 24	
Saturday	0 17			0 39	0 60
Summary—					
Hours per week	4.38	2.05	3.48	1.15	2.43
Kw.-hr. per week	1.71	1.19	0.80	0.13	1.34
Cost per week*	$0.137	$0.095	$0.064	$0.01	$0.107
Cost per month*	$0.550	$0.380	$0.260	$0.04	$0.430

Total bill, lighting and appliances	$3.36
Income for lighting	1.53
Income for appliances (34.5 per cent of total)	$1.83

*At 8 cents per kilowatt-hour.

"My housekeeper expresses the opinion that electrical appliances are not convenient unless they work properly and if one has to be boxing them up and sending them off for repairs there is no advantage in using them.

"As to the inconvenience or difficulty in getting repairs, we took the heating pad to headquarters of the operating company in this section from whence it was sent to the factory. We had to pay express charges both ways and repair charges and wait sometime before we got it back. Since it was returned to us last winter it has been used only twice, because on the first and second point of the switch no heat is given out while on the third point it is too hot for use.

"The manager of the local company was very polite to us and he explained his company could not make repairs, etc.

"Contrast this situation with my situation as an owner of a well known automobile. Regularly, once a month, I received a mimeograph letter from the head office of the automobile company which contains suggestions as to the care of my motor car, how it should be oiled, how it should be looked after, and how to operate the car to obtain the best results, etc.

"It seems to me that the companies that are engaged in the manufacture of electric appliances and the companies that have electric current to sell, should cooperate in the matter of making the use of electric appliances more generally understood. I believe that the electric appliances have real utility conveniences. Especially in homes where the mistress of the house does much of her own work. In such homes they cannot afford large repair bills and if the appliances are to be used they must be a real convenience and not too expensive.

"I would suggest that all electric companies should put on a repair man with a motorcycle and repair outfit who shall promptly respond to all calls for repair work on electric appliances, making a nominal charge for his time. Also that the meter readers gather the material for a card index as to the number of electric appliances owned by each customer, which are in use, and if all those in use are giving satisfactory service."

The above letter may represent a strange condition, but some of the suggestions contained in it are worthy of serious consideration. As the greatest value to central stations comes from the continual use of heating appliances it seems very essential that the central station should see that these appliances are kept in operating condition, and that the small amount of expense involved to pay for this information would be more than overcome by the increase in revenue which would be produced by the continual use of the appliance. The manufacturer must also endeavor to make his appliances more able to withstand the ordinary wear and tear of household use, but this is going to be more difficult, owing to the fact that the central stations are demanding from the manufacturers appliances which can be retailed at lower prices.

The introduction of heating appliances is, of course, greatly limited in some localities due to the small proportion of residences which are wired for electricity. People living in unwired houses are not usually considered as prospective customers and have therefore been consistently avoided when special campaigns are being conducted. It has been demonstrated by experience, however, that even this class affords an opportunity for appreciable sales. During one special campaign which was conducted just previous to the Christmas holidays the solicitors were instructed to leave appliances on trial even though the house was not wired. Many sales were effected by this means, the appliances being purchased for gifts to friends whose houses were wired for electricity. A few were sold to others contemplating house-wiring.

Importance of Industrial Electric Heating Shown by Detroit Convention.

That there is a need for specialized activity in the field of industrial electric heating is strongly indicated by the tenor of the papers presented at the convention of the Industrial Electric Heating Association at Detroit, Michigan, on November 26 and 27. This association was formed about a year ago, the aims and objects being explained as follows:

"Recognizing the opening of a new and heretofore undeveloped field in the electrical industry, the importance of which, and the possibilities for the development of which are so great, and the present knowledge so small, it seems imperative that an organization should be perfected to study and gather together all the available information on this great subject for the benefit of its members and of the industry at large and for the exchange of ideas and data."

It was recognized that in developing what is practically a new branch of the industry, the experience of each is of the greatest value to all. An unsuccessful installation not only affects locally the company responsible for it, but rebounds to the discredit of industrial heating everywhere: while the experience and "good will" of a successful installation is of practical value to central-station men in general. The magnitude of this branch of activity is well known and appreciated by the progressive representatives of the new association. Statistics were quoted which showed that a much greater load might be expected from this business than from the motor business. It was stated that the industrial electric heating business already on circuit amounts to the total power output of the three largest central stations in America. The enamelling oven installation of the Willys-Overland Company, was quoted as an indication of the tremendous pos-

sibilities of the future. By changing over only one of its heating operations the heating load now exceeds the demand for both light and power.

A. K. Young, of Toledo, one of the founders of the association, and president, stated at the opening session that since the first meeting about a year ago, members of the association had closed contracts for industrial electric heating aggregating 100,000 horsepower.

Several interesting papers were presented and a general informal discussion ensued which brought out much valuable information. It was pointed out that industrial heating salesmen have an important talking point, when it is realized that electricity at one cent per kilowatt-hour would compare favorably with artificial gas at 25 cents per 1,000 cubic feet.

Relative to electric melting furnaces it was shown that while the cost of producing ordinary crucible steel varies from $45 to $60 a ton, electric steel of like quality is being made in Detroit for prices ranging from $25 to $27 a ton. Ordinary converter steel costs range from $35 to $40 a ton, but with the electric furnace a like steel is being produced for $20 to $23 a ton. Ordinary open-hearth and a comparable electric steel can both be made for $19 to $25 a ton. It has been found at Detroit that the heating cost in steel-melting furnaces is higher for electricity than for gas, but the lower raw-material cost and lower labor cost incident to the electric process make it less expensive in the long run.

Papers were presented by C. F. Hirshfield, of the Detroit Edison Company on "Power Requirements of Japanning Ovens," by H. J. Kunz of the Toledo Railways and Light Company on "The Willys-Overland Company's Installation", by E. S. Zuck on "Electric Welding," by F. W. Dygert on "Origin of Electrically Heated Japanning Ovens" and a paper entitled "Japans and Enamels" by Mr. Donahue.

Ratio of Coal Consumption to Energy Generated.

Kilowatt-hours generated per ton of coal, by ten of the principal central stations in Massachusetts, show a wide range of results. The following were the comparative totals of energy generated, tons of coal consumed, and its cost, for year ended June 30, 1915:

Company	Kilowatt-Hours Made	Tons Coal Consumed	Kw.-Hrs. per Ton	Cost of Coal
Edison of Brockton	16,285,691	15,625	1042.28	$4.77
Cambridge Electric Light Company	15,205,260	15,251	997	4.02
Fall River Electric Light Company	14,008,335	14,871	942	3.67
Worcester Electric Light Company	32,359,570	37,462	863.26	4.14
New Bedford Company	8,356,375	10,470	798.1	3.60
Lynn Gas & Electric Company	12,755,920	16,589	768.9	3.54
Lowell Electric Light Company	13,097,151	17,299	757	4.69
Salem Electric Lighting Company	6,648,280	8,973	740.9	4.07
Haverhill Electric Company	6,992,650	9,600	728.4	4.66
Pittsfield Electric Company	5,992,160	11,758	509.6	3.92

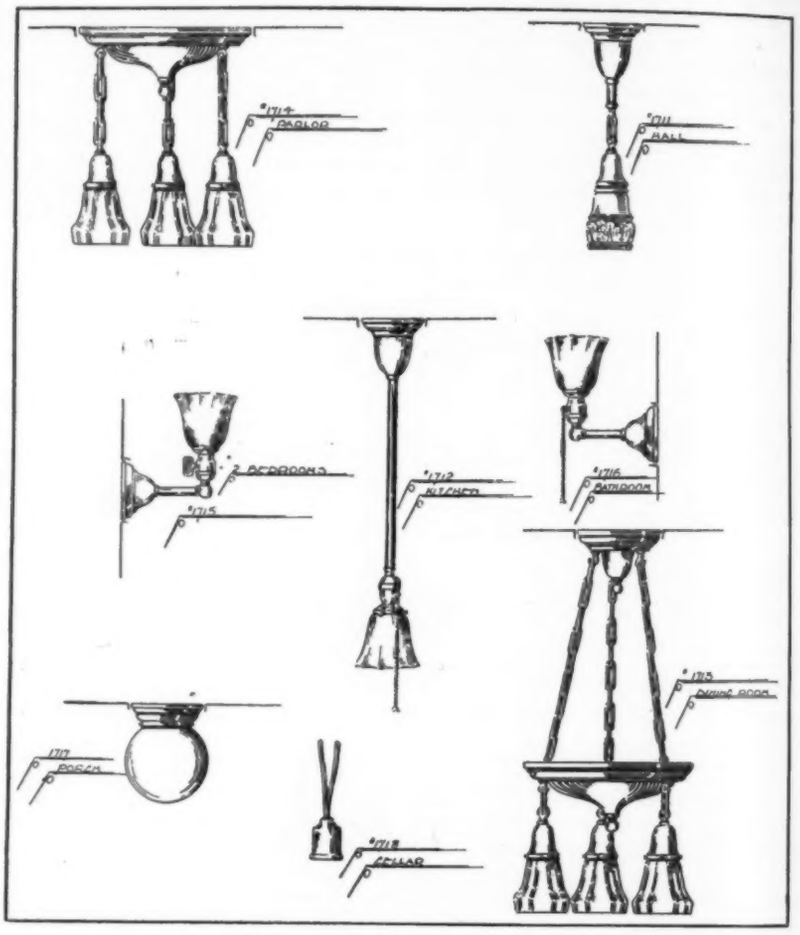
OVER 400 HOUSES WIRED IN TWO MONTHS.

Results in Providence House-Wiring Campaign.

The Narragansett Electric Lighting Company, Providence, R. I., inaugurated a house-wiring campaign about October 1. Up to December 1, more than 400 contracts had been signed up, mostly for the standard proposition of 11 outlets, 13 lights and fixtures including a six-pound iron, for $79.50, payable 10 per cent down and monthly installments of $2.98 running over a period of two years.

The agreement between the company and the house-owner prescribes that the company agrees to have installed by some reputable contractor selected by the customer the wiring and outlets with fixtures, as set forth in the contract as follows:

Dining room, living room, three lights each; two bedrooms, kitchen, bath room, cellar, hall and porch, one outlet and one light each. Kitchen and bath room fixtures to be equipped with pull-chain sockets, porch and cellar lights controlled by flush wall switches (single pole). Lamps to be: Four 25-watt, eight 40-watt and one 60-watt Mazdas. The following additions may be made to the offer:



Fixtures Furnished in Campaign.

Extra ceiling and wall outlets, each $3.75.

Extra outlets for single-pole flush switches, $4.25.

Extra outlets for 3-way flush switches, $4.75.

Extra outlets for 2-point electrolier switches, $4.75.

Extra outlets for baseboard, floor or wall receptacles, $4.25.

Extra outlets with porcelain key receptacle for basement, $4.25.

Separate circuit for heating devices, $8.25.

Pull-chain sockets, 25 cents.

Deductions:

Porch light, complete equipment, $4.95.

Cellar light, complete equipment, $4.65.

Electric iron, $1.50.

Fixture set, if personal selection is desired, $10.00.

The agreement covers old house work only.

Electrical Construction

BUSINESS HINTS FOR DEALER AND CONTRACTOR.

By G. D. Crain, Jr.

Using Up Slack Time.

A successful dealer-contractor believes in making work for everybody connected with his organization, if there isn't anything to be done that requires immediate attention. Just as he will give the construction men inside jobs, if nothing is available in their regular line, he sees to it that the office people have work of a sort that can be done when the regular routine slacks up somewhat.

This dealer, by the way, has developed quite a little jobbing business with small concerns in the interior of his state by means of form letters, individually typewritten, however, which are sent out exploiting different lines for which the house has the agency. These letters are not written in the regular course of business, but whenever the stenographers have leisure, they refer to the list which is used in connection with this work, and write a few letters covering the proposition which is being worked up at that time.

"I was in the office of another electrical concern recently," said this dealer, "and I saw one of the girls reading a novel. In another place, an office employee was embroidering because there was nothing else for her to do. I have stock jobs, like circular work and new-business development, to take up whatever leisure develops in my place, and the girls are always busy."

This doesn't mean that this dealer is a slave-driver, or that he wants to get work for every second of time he is paying for; he is simply a business man, and it hurts his ideas of efficiency to have loafing in the office, just as much as when the journeymen are killing time. And it's dollars to doughnuts that the girls would just as soon do the work he sets for them as twiddle their thumbs.

Watch Your Step!

General contractors, as a class, are probably higher up in the scale than they were a few years ago, and the agitation of electrical contractors and others in the mechanical end of building construction may be responsible for a good deal of the improvement. But the situation is not what it should be even yet, and the contractor who can get a job directly instead of through a general contractor is justified in doing it every time.

To show how the canny "general" works the game, an electrical concern was called up not long ago in connection with its bid of $600 on the wiring for a newspaper office.

"I want to give you that job," the contractor said, "but you're $52 out of line."

"What do you want me to do?" asked the electrical man.

"Why, reduce your bid $52," said the contractor. "You don't want me to give you that much money, do you?"

The electrical expert thought a moment, and finally said, "All right." He was told to go ahead, and did so, keeping tab on the cost of the work and finding that he was lucky to break even.

In the meantime, however, he had been comparing notes with some of the others who had figured on the job, and found that his original bid of $600 was $100 low! In other words, the general contractor had simply bluffed him into cutting off another $52 on the work, and adding that much to his own profits—which was pretty fair pay for a few minutes' telephone talk.

Of course, the contractor who took the work said, "Never again!" And now, when he is asked to shade his price so as to get down on the level with the rest, he declines to do so, politely but firmly. And most of the time when general contractors make a suggestion of that sort, they finally come back and give him the business at the full price.

"The right way to bid is to quote the rock-bottom price first," said this electrical contractor. "If you've figured right the first time, you can't afford to change your estimate later on. And if you've figured too high, you can gamble that somebody else would have got the work, and that you wouldn't have been telephoned to by the contractor."

Letter Signs in the Store.

The display of electrical merchandise is not complete without an explanatory sign of some kind, carrying the price and a little selling talk about the work that the article will do, and why it should be used in the home.

If the dealer were to go to a professional sign-painter and have these signs made up for every piece of goods he is showing, it would take more money than he would care to spend for this purpose. The result is that many dealers show the goods without signs of any kind, and it takes a person of an unusually curious turn of mind to find out much about them.

The signs are necessary, but it is not a case of going to the commercial sign man or doing without. Some youngster in the store can be taught to letter, and many a boy has a knack for this sort of work or can pick it up with a little practice. Besides, most of the Y. M. C. A.'s have night schools where lettering is taught, and it would be worth the while of the store to pay the tuition of some employee, so that the latter could attend to the work that needed to be done.

Effort of this kind will make itself felt in increased sales.

Cutting Out Waste Effort.

While the contractor who makes an effort to get every job that shows itself is to be commended for his enthusiasm, there is no getting away from the fact that in a great many cases it is bad business to spend time—which means money—trying for work which, if judgment were used, the contractor would know he had no chance to land. The wise member of the trade conserves his effort, and when he sees that the chances are against him, for one reason or another, he promptly turns to something else, without wasting mental or physical energy at a futile prospect.

For instance, there are some architects who are always figuring the cost of work which never eventuates. A good many members of this profession endeavor, legitimately, of course, to interest capitalists in the erection of buildings of a certain kind at a certain location; and as a rule, carrying out the project depends on its being done for a limited amount of money. The result is that these architects are constantly asking for bids on proposed buildings which never get beyond the blueprint stage, and the contractor who makes a point of marking such offices off his list will be the gainer. Of course, one of these "long shots" may go over, but after a little experience it is possible to determine whether the chances favor it or not.

Then, again, the contractor is likely to have calls from concerns which he knows have been dealing regularly with other firms. A sudden switch of this kind should not be productive of too much jubilation, but rather the question should be asked, "Why?" And sometimes the solution of the problem will furnish a good reason for staying off the work.

In one case a contractor who was told to submit figures on a piece of work for a concern which had never before indicated that he was *persona grata*, promptly made a few inquiries of the other houses which had been handling its business, and was told that it had proved to be unduly hard to collect accounts under five or six months. That was a sufficient tip to the contractor not to take a chance.

There are scores of other instances that every contractor can call to mind where the general line-up made it a difficult if not an impossible task to get the business. Too many good opportunities to land profitable work without excessive effort are available to warrant the good business man in going after a job where he knows that the odds are against him.

Enter Sales in Detail.

No matter whether a sale is made for cash or to be charged, it is a good plan to enter the full details of the transaction, if for no other reason than to be able to fill "repeat orders" without having to do much investigating.

For instance, a customer may buy a lamp for an automobile without knowing just what the description of the bulb is. This is almost certain to be true if the car is brought to the store and the dealer or his salesman allowed to make the change. Later on, a telephone call may be made for a couple of additional lamps of the same voltage and candlepower as those that were purchased "last time." Of course, the customer might be asked to name the model of his car, and reference then made to the lamp manufacturer's catalog to determine the correct specifications; but it is not always convenient to get this information, and the record of the previous sale is a check on the work, in any event.

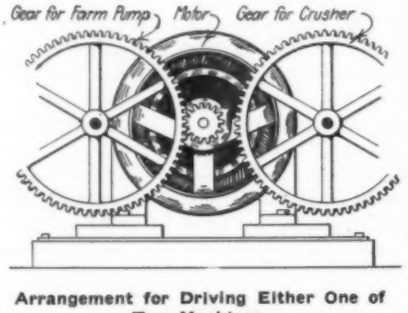
Experience has shown that many mistakes are made in connection with supplying lamps for automobiles. Sometimes the clerk finds that the lamp called for is not in stock, and attempts to make a substitution. If a lamp of lower voltage rating is used, it will promptly burn out, and the customer will insist on remembering the poor service that was given him. A lamp of higher voltage than necessary will take care of the current, but it should be explained that it is larger than necessary, and a change to the correct lamp made at the earliest opportunity.

Simple Direct Motor Drive for Two Machines.

The following method of driving either of two machines is perhaps not original nor unique, but it is a very simple and inexpensive way of accomplishing this result, which may prove of interest to electricians confronted with a similar problem.

A friend of mine had a 2.5-horsepower, single-phase motor connected to a farm water pump. He was desirous of also driving a corn crusher but did not feel like laying out the money either for a new motor or a larger one, neither did he wish a shaft, pulley and belt drive, so he asked whether he could do anything to eliminate the extra expense. He said that he could stop the pump to run the crusher, if necessary. But the pump gear was direct-connected to the pump and it seemed to require putting in a clutch of some sort.

I therefore devised the scheme as shown in the accompanying diagram. The gear of the corn crusher



Arrangement for Driving Either One of Two Machines.

was set in line and as near to the motor gear as possible without touching it when the pump was running. When the crusher was to be run, the motor was slid on its base out of mesh with the pump gear and into mesh with the crusher gear, and the crusher was driven instead of the pump. When the pump was needed, it was only necessary to slide the motor back into its original place. It could be slid on the base and controlled by the end screws, being fastened down wherever wanted, which took only five minutes but eliminated the extra cost otherwise necessary. In case it were required to run the motor in the opposite direction for the crusher, a double-throw switch could be used.

William T. Estlick.

Contractors' Convention.

The next annual convention of the National Electrical Contractors' Association will be held at Hotel McAlpin, New York City, July 18 to 22, 1916. The Entertainment Committee consists of George Weiderman, chairman; W. C. Peet, L. Freed, Lewis L. Brown, C. A. Christesen, E. J. H. Thiemer, Louis Kalischer.

The chairman of the Convention Committee is James R. Strong.

The Executive Committee of the association will hold a meeting at Richmond, Va., on February 7 and 8.

The Cost of Liability Insurance.

Lynton T. Block, attorney and manager of the Utilities Indemnity Exchange, which is operating so successfully among electrical contractors and public utilities, saving them a large part of their insurance premium, has drawn some conclusions from the report of the examination of one of the largest and best known liability insurance companies by two of the leading insurance departments in the United States, which go to demonstrate how it is that insurance through the medium of reciprocal insurance exchanges is obtained at such a great reduction in cost.

It is frequently difficult for persons not familiar with the conduct of the insurance business to understand how it is that reciprocal insurance organizations are able to effect the great savings in the cost of insurance which their experience has demonstrated results from that form of insurance.

The question is easily answered when the facts are gone into. The principles of insurance are simple and they only become difficult of comprehension when surrounded by the maze of technical terms.

Insurance companies are prone to refer to their underwriting profits as a given percentage of their total premium income, instead of figuring it upon their capital stock. Thus they will refer to an underwriting profit of five or six per cent, when in point of fact their underwriting profit when compared to their capital invested is exceedingly large.

Some interesting figures appear in the recent examination of one of the largest and best known foreign liability companies with a United States branch office, by the New York and Massachusetts Insurance Departments—the report covering the operations of the company up to December 31, 1914.

The following interesting figures are found:

Total cash deposit capital in the United States	$ 250,000.00
Total profit remitted to the Home Office in 28 years, covering entire period of its business	3,329,140.09
Average dividend per year	136,755.00
Percentage profit	54.7
Present assets over liabilities	2,632,907.97
Undivided profits, termed surplus	2,382,907.97

From the above it will be seen at a glance that the company starting 28 years ago with $250,000 deposit capital in the United States, none of which has ever been used for losses, made a profit to its stockholders, which they

have received in cash, of more than $3,800,000 and the company now has in the shape of undivided profits nearly $2,400,000, so the total operations of the company for the 28 years have resulted in a profit of $6,212,048.06, which reduced to annual percentage amounts to a net profit of 88.75 per cent of its capital each year.

It is frequently said that while insurance companies made money in years past, yet in recent years they have suffered a reaction and with difficulty keep their heads above the surface. It is interesting to note that the underwriting profit (the profit obtained from premiums collected) of the Employers' Liability Assurance Corporation for the year 1914, amounted to $436,605 or 175 per cent of its capital in this country.

It is surprising to note that well informed, keen business men are so often misled into paying high prices for insurance in the large companies, simply because those companies possess tremendous surpluses. Were they to stop and consider that these surpluses are themselves the outgrowth of excessive premium rates and that in point of fact losses are invariably paid out of premiums and not paid out of capital or surplus, they would undoubtedly avail themselves of the more economical systems of insurance.

Look down through the financial statements of the large insurance companies and it will be seen that the surplus account of all these, increases year by year except occasionally when the surplus is transferred to the capital account. There is probably no other business enterprise which bases its plea for high charges on its past accumulated profit.

Reciprocal insurance escapes many of the legitimate expenses necessary to the conduct of stock insurance companies, and this large element of profit is returned to the policy-holders of reciprocal exchanges instead of going into the pockets of the stockholders of the stock insurance companies.

Utilities Indemnity Exchange, St. Louis, Mo., devotes its time and attention to the insuring of public utilities and electrical contractors and is in a position to save them a very large proportion of their insurance premiums.

National Code Final Authority in Massachusetts.

The following order has been adopted by the Gas and Electric Light Commission of Massachusetts with respect to rules for electrical installations:

"Voted, pursuant to the provisions of Section 4 of Chapter 296 of the General Acts of the year 1915, to adopt the following rules and requirements for the business of installing wires, conduits, apparatus, fixtures or other appliances for carrying or using electricity for light, heat or power purposes in this Commonwealth, viz.: All persons, firms or corporations entering into, engaging in or working at said business, either as master or employing electrician or as a journeyman electrician, shall be governed by all the general and special laws, and municipal ordinances, by-laws and regulations, now or hereafter in force, applicable thereto, and in respect to all matters not therein expressly provided shall be governed by the regulations of the National Electrical Code, edition of 1915, as published by the National Board of Fire Underwriters on recommendation of the National Fire Protection Association, copies whereof duly attested by the secretary of said association are on file with the state examiners and with this board."

Among the Contractors.

Baltimore contractors are extremely busy and the last month indicated that most of the live wires will finish up the year ahead of their best expectations. There seems to be quite a bit of work in the small towns surrounding Baltimore and quite a few of the contractors are equipping themselves to handle this business at a minimum cost. One of the largest electrical contracts awarded there in years has been given to the Johnson-Livingston Company, of New York, for the electrical installation in the United States Industrial Alcohol Buildings, now in the course of erection at Curtis Bay. There are fifteen buildings in all.

The Blumenthal-Kahn Electric Company has also been coming in for its share of the big business that was distributed during recent weeks. This firm was awarded the electrical installation of the garage building of the International Motor Truck Company. The firm is also wiring one of the largest residences in the state. It is the home of Martin H. Smith, at Hilsmere. This job is all conduit work and included a full system of burglar alarms. The Blumenthal-Kahn Company finished the Standard Oil Company job in Cumberland recently. It took about two months to complete this piece of work, which included the wiring of the new station for tank cars. This included five buildings and all of the work between the buildings was in lead cables.

The Kingsbury-Samuels Electric Company secured the contract for wiring the new concrete building, which is now in the course of construction at Holliday and Fayette Streets, and which will be occupied by the C. J. Youse Company.

Brice and Springham were awarded the contract for installing a new generator in the Equitable Building. The contract includes the wiring and circuit-breakers, all lead-covered cables to be used.

Electrical concerns of Columbus, O., have lately closed a considerable amount of new business. The most important contract is that secured by the Erner & Hopkins Company, from the Hayes Wheel Company, of Jackson, Mich. Equipment in this plant is to be duplicated in a new plant at Anderson, Ind., the main building being 1,000 feet in length. Between 100 and 150 motors are to be installed, which will be in unit groups. The same company is replacing steam power at the Nelson lumber yards and gas at the Sowers-Leach lumber yards with 15 motors each, and is installing individual motors at the works of the Bryan Foundry Company, manufacturer of electric light standards. A 50-horsepower gas engine will be supplanted here. The three plants last mentioned are in Columbus.

The Sacket Mine Supply Company has the contract for wiring the village of Darbeyville, O., and supplying generators, switchboard and other equipment. Another piece of work for this company is a new motion-picture theater at Delaware, O.

The Avery-Loeb Electric Company will install a number of motors in the plant of the Lancaster Glass Company, Lancaster, O., and provide electric power equipment for an extension to the plant of the Preston Lumber Company, Columbus.

The business of George Kaelberer, of Mattoon, Ill., will be carried on after January 1 under the firm name of Kaelberer Brothers. The new member of the firm will be William Kaelberer. The bicycle and motorcycle department will be closed out and the Kaelberer Brothers will devote themselves exclusively to handling "everything electrical."

1915 Edition of National Electrical Code Issued.

The 1915 edition of the National Electrical Code has just been issued. In it are incorporated the revisions made last spring. The construction and installation rules up to No. 48 are printed in full. Rules 49 to 99, inclusive, covering the requirements of fittings, materials and details of construction of apparatus, are printed in condensed form, giving only a partial outline of requirements. This makes the booklet more compact, the total number of pages being 224, than would be the case if all of the detailed specifications were given in full.

The Massachusetts Electrical Contractors' Association has appointed J. E. Wilson as a special representative to travel in that state and build up the organization.

Public Service Commissions

Conducted by William J. Norton

NEW JERSEY.

Newton Gas and Electric Company. The receiver of the Newton Gas and Electric Company applied for authority to put in effect a new schedule of rates with a maximum rate of 20 cents per kilowatt-hour. The present schedule of the company provides a maximum rate of 15 cents per kilowatt-hour.

The Board bases its estimate of the cost of reproduction new of the property upon comparisons, using data from appraisals which have been made from time to time by the Board's engineers.

A number of tables are included in the decision comparing the company's statistics with those of other companies, where the conditions are somewhat similar. Such comparison shows that the operating ratio of ten companies averages 66.79 per cent, while the operating ratio of the electric department of the Newton Company is 61.24 per cent. The gross revenue of the Newton Company per kilowatt-hour sold is lower than with a large number of companies, and the operating expense is about midway. Analysis of the relations between peak load and capacity of plant for fourteen companies shows an average rated capacity of 190 per cent or a 90 per cent overload capacity. The Newton plant is found to have a rated capacity of 265 per cent of the peak load. Newton has 55.6 customers per thousand, while a simple average of four towns of about the same population gives 68.3 customers per thousand.

No dividends have ever been paid on the company's stock, but interest has been paid on the outstanding bonds up to the time of the receivership. The Commission finds that the property has been overcapitalized since a consolidation in 1901, to such an extent that the inability to pay dividends on stock is no indication of the lack of earning power under the existing rates.

The Commission also finds that investments have been ill advised and that the service has not been adequate and satisfactory.

The decision says: "The Board is satisfied that the lack of revenue is not to be attributed to insufficiency in the rates charged per unit of energy. An increase in rates does not always bring a greater revenue. On the contrary, greater revenues are frequently obtained by a reduction in rates. The allegations of the citizens of Newton with regard to poor service are borne out by the facts, and the claimed insufficiency in revenue is largely attributable to inefficiency in service. Improvement in character of service may reasonably be expected to result in an increase in revenue without increase in the rates. . . .

"The insufficiency of return does not indicate under the circumstances here, that the existing rates are unjustly and unreasonably low, but rather that there is a want of a reasonable degree of development even under the existing rates, which can be accounted for by the long continued inefficient operation and service."

The receiver contends that without the proposed increase in rates, further improvement in service cannot be made.

The Board concludes, however, that the application for the increase has not been sustained. "The people are entitled to a safe, adequate and proper service at just and reasonable rates. The company is entitled for the rendition of such service to a fair return upon the reasonable value of the property devoted by it to the public use.

"Long continued and patient effort by the Board and its engineers to secure for the community the character of service to which it is entitled, has resulted in some improvement, but the service rendered falls far short of a safe, adequate and proper service. . . .

"It seems impossible, therefore, to secure for the community the service to which it is entitled at just and reasonable rates as long as operation continues with the receiver.

"In this situation, in view of the duty of the utility as to service, the financial interests of those holding the securities of the company must give way to the rights of the community.

"In the judgment of the Board, the problem admits of but one solution, and that is the sale of the property in the chancery proceeding.

"Through such sale, a purchaser may, perhaps, be found who, paying a reasonable price for the plant, and investing the added money required for its readjustment, will be able to furnish the community a satisfactory service at a reasonable rate."

In addition to finding that the proposed rates are excessive the Commission finds that the form of rates is objectionable. Certain of the rates are regressive. The minimum charge, in accordance with the proposed new schedule would vary with the connected load. The Board states that a flat minimum charge is preferable, and approves the provision in the present rates of the company of $1.00 per month.

WISCONSIN.

The St. Croix Telephone Company. The Commission ordered a readjustment of the rates of the St. Croix Telephone Company. The new rates are, $1.50 gross or $1.25 net per month for single-party telephones, $1.40 gross or $1.15 net for two-party telephones, and $1.25 gross or $1.00 net for four-party telephones.

The Village of Fennimore applied for authority to increase its electric rates. A complaint was subsequently filed with the Commission, signed by 26 citizens of the village, alleging that the rates of the municipal utility are discriminatory and its service inadequate. The two matters are considered together in the Commission's opinion and order.

The Commission determines a net revenue sufficient to cover interest of 4.5 per cent on the portion of the bonds now outstanding, depreciation and taxes.

The Commission says: "In addition to interest, it is imperative that some provision should be made for renewing the plant when it becomes worn out. In other words, some reservation should be made out of revenues to take care of the accrued depreciation. Up to the present time, this has not been done, although there is evidence that the utility will need some of the funds which should have been accumulated in the past. In the instant case, it seems that at least 4.5 per cent on $12,000 should be so provided annually.

"Taxes to an amount equal to that the utility would pay if it were operated by private persons also should be covered by the annual revenue.

"The taxpayers of the village could, as a matter of equity, demand that the rates should be high enough to yield a reasonable return on their entire investment."

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 315.—Motor-Driven Motion-Picture Machines.—About what percentage of our large cities having over 100,000 population permit the use of motor-driven motion-picture machines?—S. P. L., Topeka, Kans.

No. 320.—Distribution Losses.—I have noted the article in your November 13 issue, giving the distribution losses of the Pacific Power & Life Company. In the average town of from 5,000 to 15,000 population, with three-phase distribution at 2,200 volts primary to 220-110 volts secondary, about what distribution loss, in per cent, does good practice call for? In actual practice, what *are* the average small-town distribution losses in per cent?—F. A. G., Columbus, Neb.

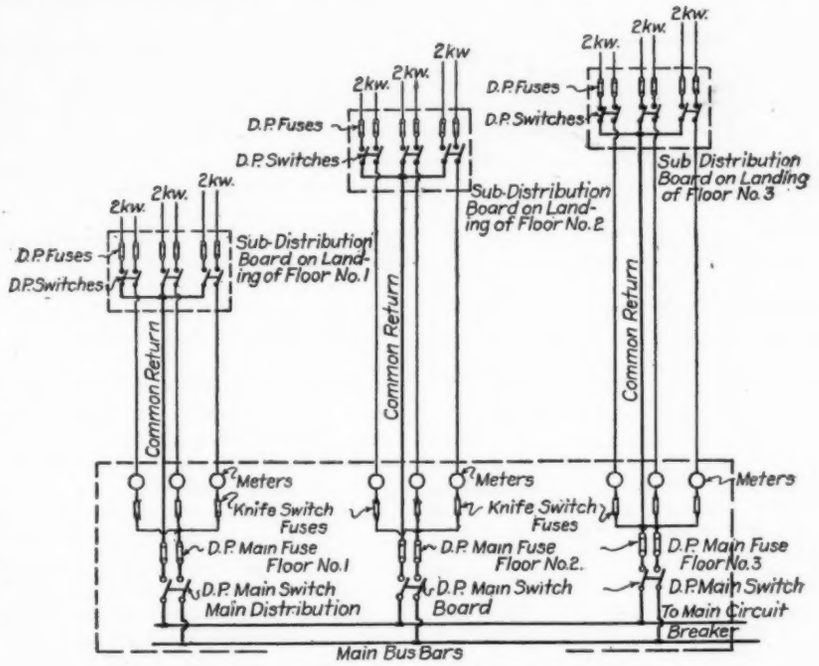
No. 321.—Co-operative Meter Reading.—In one of the large cities I have observed that both the gas company and the electric company send out their inspectors to read meters in several districts on identically the same day. Both these companies are active competitors, although there is a community of interest among them. The electric company has been proclaiming that it practically serves its residence customers at a loss, due to the high cost of meters, meter reading, billing, etc. It seems to me that by uniting the meter-reading work in a single crew the cost of meter reading would be materially reduced. Now what I would like to know is whether any state utility commissions have passed on this point, namely, allowing competing utility companies to co-operate on meter reading for the joint benefit of both the companies and of their customers, most of which are in common.—A. Z., Spokane, Wash.

Answers.

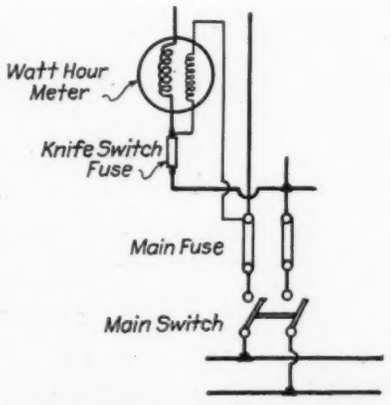
No. 317.—Wiring for Electric Ranges.—In wiring an apartment building for electric ranges, each of which has a maximum possible load of two kilowatts, what is the best arrangement of the special range circuits so as to economize wire and reduce the voltage drop to the minimum? Meters to be in the basement.—D. A. T., Chicago, Ill.

The proposed arrangement of the meters in the basement does not lend itself to the cheapest way of wiring, though no doubt the extra expense involved by the additional number of wires required will be compensated by greater convenience of meter reading, inspection, etc.

In order to save on labor and material it is proposed in the attached wiring layout to use one common return for all cooking ranges on one floor which can be conveniently controlled from one subdistribution board. As will be seen, each of these circuits is controlled by one double-pole main switch with double-pole main fuse on the main distribution board in the basement. For convenience of drawing only three cooking ranges have been combined on one subdistribution board, though this number may be increased according to the local conditions. In the main layout the connections are shown for ampere-hour meters, which should be sufficient; a small detail sketch shows the connections in case watthour meters are preferred.



No. 317.—General Wiring Diagram for Apartment-House Range Circuits.



No. 317.—Detail of Meter Connection.

The voltage regulation can easily be kept within three per cent, which is sufficient for all practical purposes. As the diversity-factor of cooking ranges in one house can easily be 100 per cent, which means that all ranges on one floor or of one circuit may have this maximum demand of two kilowatts simultaneously, the cables will have to be dimensioned for this demand. The voltage, the cable runs (distances), the number of floors, and the number of ranges have not been stated. To meet most conditions the table on next page gives required information of minimum cable sections to be used. All wires are to be stranded, the gauge numbers used are the corresponding numbers of solid wires of equal section as the stranded wires required. No cable must be smaller than equivalent of 12 B. & S. for 110 volts and 14 B. & S. for 220 volts serving one cooking range. The limit is given by the heating and not by the distance. If therefore any cooking range is only 10 yards from the main board for 110 volts or 12 yards for 220 volts the voltage will be 1.5 per cent higher than the cooking range at the far end of the circuit. This difference is too small to prove of any inconvenience.

In all other respects the wiring table in connection with the layout will give all the information asked for.—J. J. W., East Liberty, Pa.

A stove requiring two kilowatts, or approximately 20 amperes at 100 volts, could be operated successfully with No. 10 wire, if not over 50 feet from meter. Where more than 50 feet distant No. 8 wire would be necessary so as to avoid a serious voltage drop. Many electric stoves have separate circuit fuses for

WIRING TABLE FOR COOKING RANGES, EACH CONSUMING 2 KILOWATTS.

Mean distance of cooking range from main board in basement.	Cable Sections for 110 Volts. Size of single leads from main distribution board through sub. distr. board to individual range at 18 amperes.		Sizes of common return cable from main board to branch board, according to No. of cooking ranges to be served by one subdistribution board.					
			3 ranges, 54 amperes.		4 ranges, 72 amperes.		5 ranges, 90 amperes.	
Yards	B. & S.	Sq. in.	B. & S.	Sq. in.	B. & S.	Sq. in.	B. & S.	Sq. in.
20	12	0.00515	7	0.0162	6	0.0206	5	0.026
32	10	0.0082	5	0.026	4	0.0326	3	0.041
50	8	0.0128	3	0.041	2	0.052	1	0.0655
	Cable Sections for 220 Volts (as Above, but Only One-Half Amperage)							
Yards	B. & S.	Sq. in.	B. & S.	Sq. in.	B. & S.	Sq. in.	B. & S.	Sq. in.
24	14	0.0032	9	0.011	8	0.0128	7	0.0162
40	12	0.00515	7	0.0162	6	0.0206	5	0.026
60	10	0.0082	5	0.026	4	0.0326	3	0.041

No. 317. (First Answer.)—Table of Cable Sizes for Electric Ranges.

each element, but if this is not the case, a distribution cabinet could be placed directly back of, or near the stove and each element's leads run to a separate cutout in said cabinet. This is about as economical, as well as convenient, a method for electric stove wiring as could be installed.—B. W. C., Detroit, Mich.

No. 318.—National Electrical Code Changes.—On what date do the changes made in the National Electrical Code every two years go into effect? I have been told it is on January 1 following the year of revision; others have told me different dates and I have even been told there is no fixed date.—C. C., New Haven, Conn.

The Electrical Committee of the National Fire Protection Association, under whose supervision the National Electrical Code is revised biennially, has no authority to state at what date the provisions of the new Code shall be in force, as this is a matter entirely in the hands of the various inspection authorities. Some authorities will undoubtedly allow more time than others for contractors to familiarize themselves with the new provisions, but the date is entirely in the inspection department's hands and is not a matter which the committee may decide.—R. S., Boston, Mass.

No. 319.—Center Suspension of Street Lamps.—In what cities in this country, if any, is there used to any extent the system of suspending street lamps over the center of the street by means of cables between the opposite houses, no posts at all being used? This method is very successfully used in London and some other European cities, but to my knowledge little or not at all here. What is the objection to it?—P. N. V., Albany, N. Y.

To my knowledge this method of mounting street lamps is not standard in any American city. It is used occasionally where special conditions require the complete absence of poles, as around freight docks or railroad freight stations where poles would impede the free movement of trucks and delivery wagons. The very congested and evenly built up condition of many narrow streets in the oldest large cities of Europe accounts for the use of this system there. Aside from the complete absence of poles or posts, the advantage of this method of lamp suspension is the very excellent light distribution it permits; the lamps being hung high over the middle of the street give an exceptionally uniform illumination over the entire pavement and both sidewalks, also lighting up practically the entire building fronts, since these seldom exceed five or six stories.

In American cities the streets are usually wider than the old streets, at least, in European cities. There is no such uniformity of building construction. Even in the downtown districts of our large cities one frequently finds comparatively low buildings, one, two or three stories, among the very high ones; these would constitute irregularities in any attempt to attach supporting cables at a uniform height of 25 or more feet. Building owners would also object here very strongly to what they would claim to be "defacing" or "endangering" their structures. Such cables are really an impediment to the work of firemen. They also are not attractive. Trimming of the lamps is not so readily done as with post mounting. Except for narrow streets in which the buildings are solidly and uniformly built up close to the sidewalk, this method of mounting is impracticable. If center suspension is desired, it can be secured by stretching the cable between posts opposite each other at the curb, as is done in many American cities and towns. The most handsome effect is obtained, however, by mounting the lamps on more or less ornamental posts either at the curb or on islands or a parkway in the middle of the street.—D. O. R., Hinsdale, Ill.

Telephony on Aeroplanes.

In *La Lumière Electrique* a description is given of a new telephone outfit which has been devised for the use of the pilot and passenger in an aeroplane. The noise of the wind and the propeller renders conversation in the ordinary way impossible. The equipment consists of a head-set with two watch-type receivers, which are closely applied to the ears, and a special type of transmitter which is worn on the breast under the clothing. The apparatus is connected by flexibles and plugs to a battery of three dry cells capable of maintaining communication for 100 hours. It is stated that conversation can be carried on no matter how great the noise of the air and the propellers.

Boston Edison Company's Automobile Garaging Plan Recommended for City.

In a report of the Finance Commission, City of Boston, the present methods of garaging automobiles, and the private uses of the public cars, are severely criticised, and the plan of a central garage in charge of a responsible official is strongly urged upon the city government.

The Commission cites the practice of the Boston Edison Company as being efficient and free from the possibility of abuse. This company, it says, operates about 175 passengers and commercial cars, which are used in a territory 50 miles long and about 25 miles wide. Supervision of their maintenance, custody and use is exercised by the head of the transportation department, who purchases supplies, orders repairs and operates the cars under his direction. Accounts are kept in detail to permit of ready comparison of upkeep costs of each car.

A central garage at the Service Buildings houses 75 cars, these being for service in Boston and nearby territory. A repair and cleaning force is kept busy night and day. Every repair man is taught to drive, so as to have reserve chauffeurs if needed.

Fifteen touring cars formerly assigned to the exclusive use of officials are now garaged at the Service Station. The rules provide that whenever an official wishes to use a car he takes it from the company's garage and is charged a fixed rate per hour and per mile. The cost of each trip is charged to his department. Car dispatchers are in charge of the garage, and alternate on duty day and night. During business hours a starter is stationed at the main Head Place office, to which each morning four or five cars are sent.

Wireless Relay Invented.

An instrument which is capable of relaying or automatically recording wireless messages has been invented by Ray E. Hall, of Portland, Ore. The wireless signals actuate a diaphragm in a current of air, and this controls a local circuit which can be used for actuating a tape recorder or for repeating the message over a telegraph line. Accurate tuning is required, after which the instrument operates automatically and selectively, eliminating static distrubances to a large degree.

ELECTRICAL PROSPERITY WEEK SCORES BIG SUCCESS.

First Returns from Every Section of the Country Assure Society for Electrical Development That the Industry Has "Cashed In" Upon This Great Achievement. Manufacturers and Dealers Enthusiastic. Central-Station Interests Endorse the Movement.

It is as yet too early to be possible to give a complete report on how the electrical interests and merchants in the various parts of the country profited by Electrical Prosperity Week which was brought to a close on December 4. The information now at hand, however, shows that the celebration not only met, but exceeded all that was expected of it.

The Hurley Machine Company, of Chicago, manufacturers of electric washers, reports sales of material to the amount of $100,000 as a direct result of the celebration.

The Edision Electric Illuminating Company, of Brooklyn, in addition to securing many contracts as a result of its special wiring campaign, made daily sales of electrical appliances during the celebration which greatly exceeded the normal business.

The following telegram received by the Society for Electrical Development from Hot Springs, Ark., under date of December 3, shows how the commercial interests of that city profited from the celebration:

"Electrical Prosperity Week in Hot Springs reached a fitting and enthusiastic climax last night when city turned out to witness electrical parade and attend festivities in honor of the Week. From both commercial and educational standpoint it has been a great success. Interest and participation in celebration has been such as to give the strongest evidence of confidence in commercial prosperity.—Business Men's League."

Lamp manufacturers encountered a record influx of orders for flood lamps, to be used for the celebration purposes, which far exceeded their stock on hand.

The Newark office of the Public Service Corporation, of New Jersey, sold out its stock of appliances before the end of the week.

The United Electric Light and Power Company of New York was taxed to the utmost to meet the unprecedented demand for appliances.

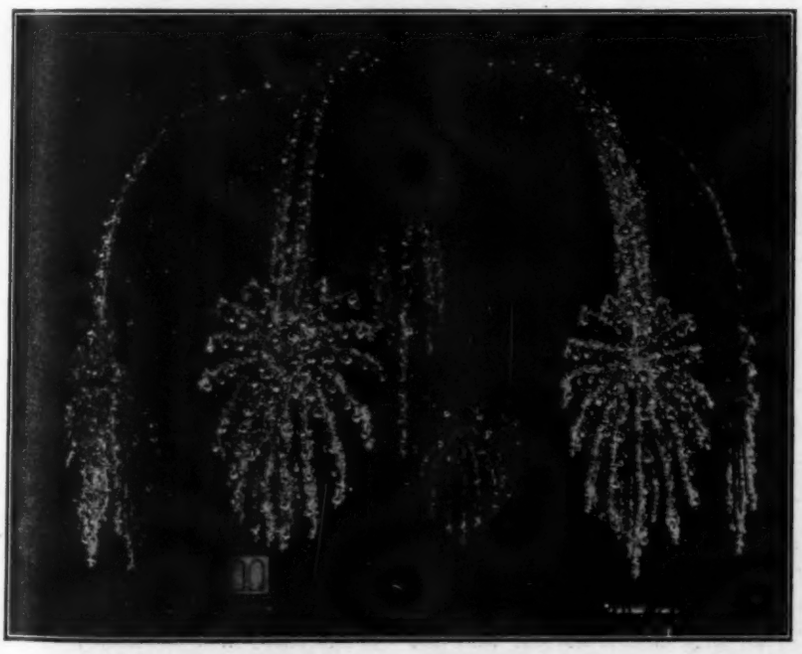
A prominent official of the Philadelphia Electric Company writes: "It will be of interest to you to know, I believe, that the Electrical Prosperity Week Celebration—during the entire period—has been so successful in Frankford that the merchants are extremely anxious to retain the special electrical displays and decorations until the first of the year. They state that their business, day by day, during the week, has been greater than that of any corresponding week in their history. We are getting the credit for most of this."

Great success attended the celebration in all parts of the country. Many merchants and electrical interests yet to be heard from have undoubtedly "cashed in" on the Week in a highly profitable manner.

Most of the features planned for the celebration were carried out in a highly entertaining and effective manner. The many electrical shows throughout the country were especially successful.

Boston, Mass.

In Boston the celebration was opened with an illumination of the front of the State House by flood lighting. Three batteries of electric lamps in powerful reflectors placed on public buildings projected their rays upon the white front of the building illuminating every nook and corner giving an extremely attractive effect, especially, when viewed from a little distance away. The illumination was repeated every night during the week. Another interesting feature of the cele-



Spectacular Electrical Displays in Cincinnati During Prosperity Week.

bration was a street parade of commercial electric floats, exemplifying the application of electric vehicles. Many other features of unusual interest made the celebration highly entertaining to the public.

Waycross, Ga.

In Waycross, Ga., among the many features of the celebration, several parades were held. The largest pageant of the Week was held Friday night, when industrial and agricultural floats participated. Mayor Beaton headed this parade. Fun and merriment were the order of the day from morning till midnight. The celebration was concluded by a Labor Day celebration in which the local unions actively participated. A final fire-works exhibition was given on Saturday night.

Pittsburgh, Pa.

Pittsburgh, Pa., was extensively illuminated for the celebration. Fifth Avenue for many blocks was ablaze with festoons of lamps, both across the street and along the buildings. These festoons were artistically arranged and carried huge shining stars suspended high above the center of the street. At intervals the blazing words Electrical Prosperity Week appeared. The merchants and other commercial interests of that city also co-operated actively towards the success of the Week by arranging highly attractive window displays and other special features.

South Bend, Ind.

The Electrical Prosperity Week Show held at South Bend, Ind., was said to have been the greatest exhibition of its kind that South Bend has ever had the opportunity of seeing. Thousands of dollars worth of electrical machinery and power devices of all kinds began to operate in the Inwood Building, at South Michigan Street, with the opening of the show. Immense crowds of people attended. Valuable arficles were given away, and music, motion pictures, and other entertainments were provided in addition to many other attractive features. All conveniences that have anything to do with electric current were provided for the people at the show.

Asheville, N. C.

In Asheville, N. C., the merchants of the city gave their support to the Week by arranging attractive display windows. Passersby could see everything in the way of electrical machinery, including toy trains on diminutive railroad tracks electrically driven, electric cooking appliances, electrically driven adding machines, and electric cleaners. The windows clearly demonstrated that anything that can be done by any other power can be accomplished through the use of electricity.

The concluding event of the Week was a great electrical parade which was given on Thursday night. Heading this parade was Electra riding in her electrical chariot. Her chariot was one of the most beautiful sights of the parade. Another prominent feature of the pageant consisted of dozens of electrically driven vehicles. These were followed by floats showing the various stages in the making of electricity and electrical appliances which are used with the mysterious

Views of Electric Show Held in Cincinnati

current. The Asheville Light and Power Company held open house Friday from 6 to 10 p. m. The officials of the company were on hand to explain the manner in which electricity is conducted from dynamo to the home of the user. The Asheville Telephone Company also observed open house every afternoon from 2 to 5 o'clock, explaining how the public is served by means of the telephone.

Rock Island, Ill.

"The History of Electrical Development," presented in a masterly address by George Loring, was a feature of the meeting held on December 1, by the Rock Island Rotary Club. John T. Marrow, the well-known electrical contractor and manufacturer, and prominent member of the National Electrical Contractors' Association, presided.

Peoria, Ill.

The Peoria Electric Club held an electric show at the Coliseum, the week of November 29 to December 4, to celebrate Electrical Prosperity Week. The building was secured from the city free and the Central Illinois Light Company gave the necessary current free, so no charge for admission was made. Twenty-five thousand people visited the show during the six days and evenings it was open. There were 23 booths and all were taken by local concerns, so it was strictly a Peoria show. The show was open from 2:30 to 10:00 p. m., after which there was a half-hour's dancing. Each evening something different was on the program and this kept the people coming.

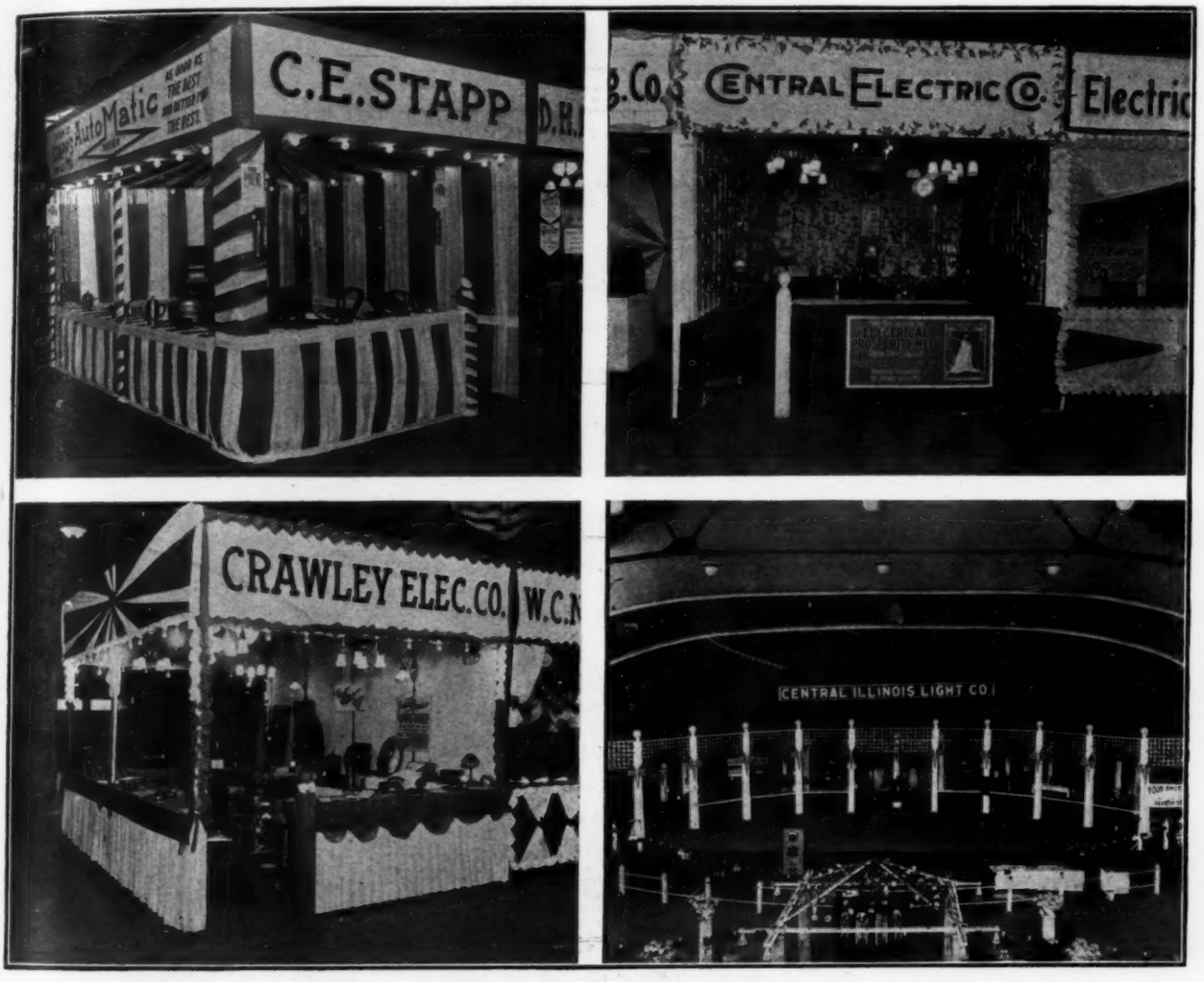
The booths were arranged under the balcony and were of a uniform size, 10 by 16 feet. The Central Illinois Light Company took the stage and one of the illustratious shows to what advantage it was used. In the center of the hall a booth was built and a lattice roof covered with vines made an attractive booth for the club.

In front of the stage the engineering corps of the Central Illinois Light Company gave exhibitions of high-frequency discharges and on some of the evenings the X-ray apparatus was connected. In the booth in the center an electric orchestrion was installed and was run continuously.

All of the local dealers and contractors made exhibits and those who have stores showed the goods they handle, and made demonstrations. The cost to each exhibitor was small and twice during the Week the local newspapers ran electric pages or parts, which helped to create a great amount of enthusiasm among the citizens, who turned out in large numbers to visit the show.

This was the only show in the state and it was the best thing that the electric club or electric men have done to help along the electric business in Peoria. Friday noon the Rotary Club and the Association of Commerce had a meeting with the Electric Club. A box lunch was served and 250 were present. The Central Illinois Light Company served the coffee and as it was also Illinois Day it made a very enjoyable meeting.

Some of the booths, which attracted considerable attention, are shown in the accompanying views.



Views of Electric Show Held in Peoria, Ill.

Cincinnati, Ohio.

Electrical Prosperity Week in Cincinnati was featured by an elaborate electrical show, held in Music Hall, one of the largest buildings of its sort in the country, and participated in by over a hundred exhibitors, including the local public service companies, and representing all of the leading manufacturers of electrical equipment and appliances. The Union Gas and Electric Company, as the Cincinnati central-station company, naturally took a leading part, with its subsidiary company, the Union Light, Heat and Power Company, serving the Kentucky towns across the Ohio; while the Cincinnati and Suburban Bell Telephone Company and the Cincinnati Traction Company were also prominent.

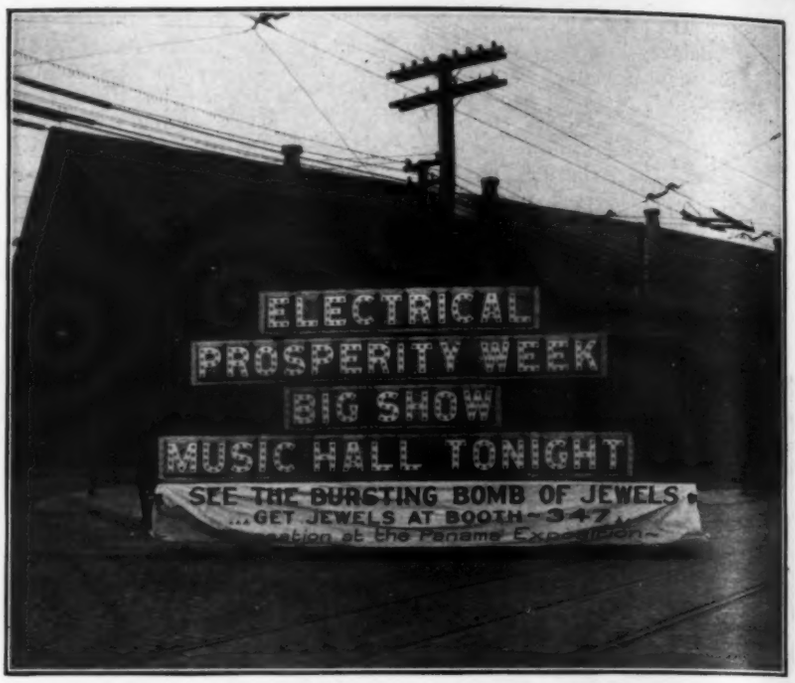
The success of the show, and the extent of public interest in it was such as to astonish the most optimistic of its promoters, and indicates that the electric era in Cincinnati has just begun. The consumption of electric current in and around the city has heretofore been relatively slight as far as the domestic user is concerned, on account of the availability of cheap natural gas; but the interest displayed in the extensive exhibit of electrical goods, and in the almost infinite uses of current in the modern home and factory, have already borne fruit in a heavily stimulated demand for electrical goods, according to exhibitors at the show.

The show was planned and conducted by the Cincinnati Electric Show Company, which was incorporated some time ago by local electrical interests for the purpose of conducting this and subsequent annual exhibits. Stock was allotted to members of the company on the basis of their space requirements, paid for, however, in cash; and while the profits expected were rather in the nature of the general benefit to the industry than in actual money, the amazing success of the show, which was attended by between 28,000 and 29,000 people who paid cash admissions, will enable the payment of handsome dividends on the investment of the exhibitors.

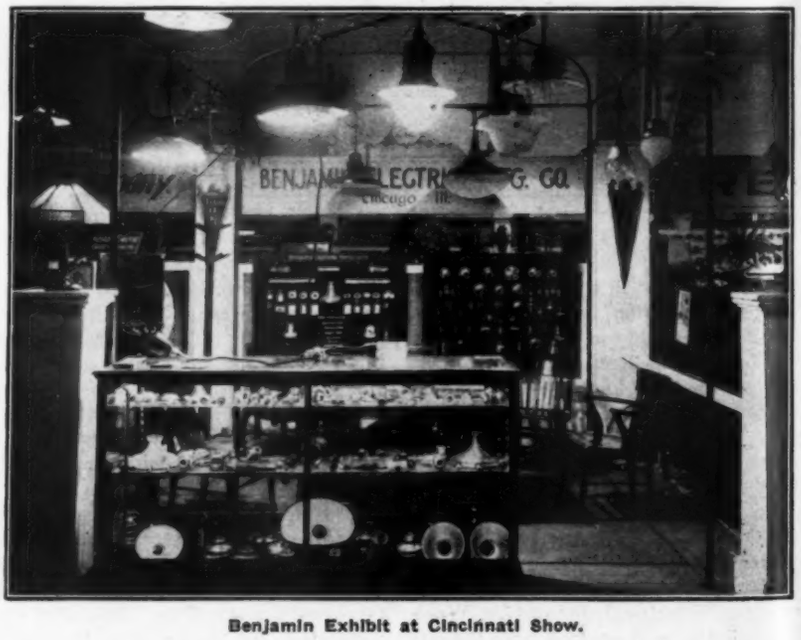
The success of the affair was no doubt largely due to the hearty cooperation of all elements interested, including the press, and the clever advance publicity campaign conducted on behalf of Electrical Prosperity Week in general and the show in particular. Advertising space was used in the street cars, in windows of electric and other shops, and on billboards, while the telephone and electric companies called the attention of their patrons to the coming event when mailing bills.

In addition to this, special illumination of Fountain Square, in the very heart of the city, was provided by the show company, in the form of four brilliant clusters of lights, suspended high above the square, and illuminating a cluster of flags hung above them, respectively. Each cluster consisted of a circle of eight 18-inch globes, containing each a 1,000-candlepower lamp. The installation was so generally admired that it will probably be retained permanently, the plan being to pay the company its actual cost and leave the clusters in place.

An electric fountain was installed on the square, also, about two weeks in advance of the show, by the Federal Sign System, which donated this to the success of the week's celebration. The fountain, which was operated by a Reynolds flasher to give the effect of constantly running water, was itself 11 feet in height, being mounted on a base 16 feet high, on both sides of which a sign constructed of porcelain enameled steel letters gave notice of the coming of Electrical Prosperity Week, and during the show, of the exhibit at Music Hall. The sign and fountain were illuminated by means of 1,000 Mazda lamps. A similar sign, mounted on a flat car, advertised the show in a novel manner during the week, being run all over the city, and going far toward justifying the proud claim of the



Electric Trolley Car Which Advertised Cincinnati Show.

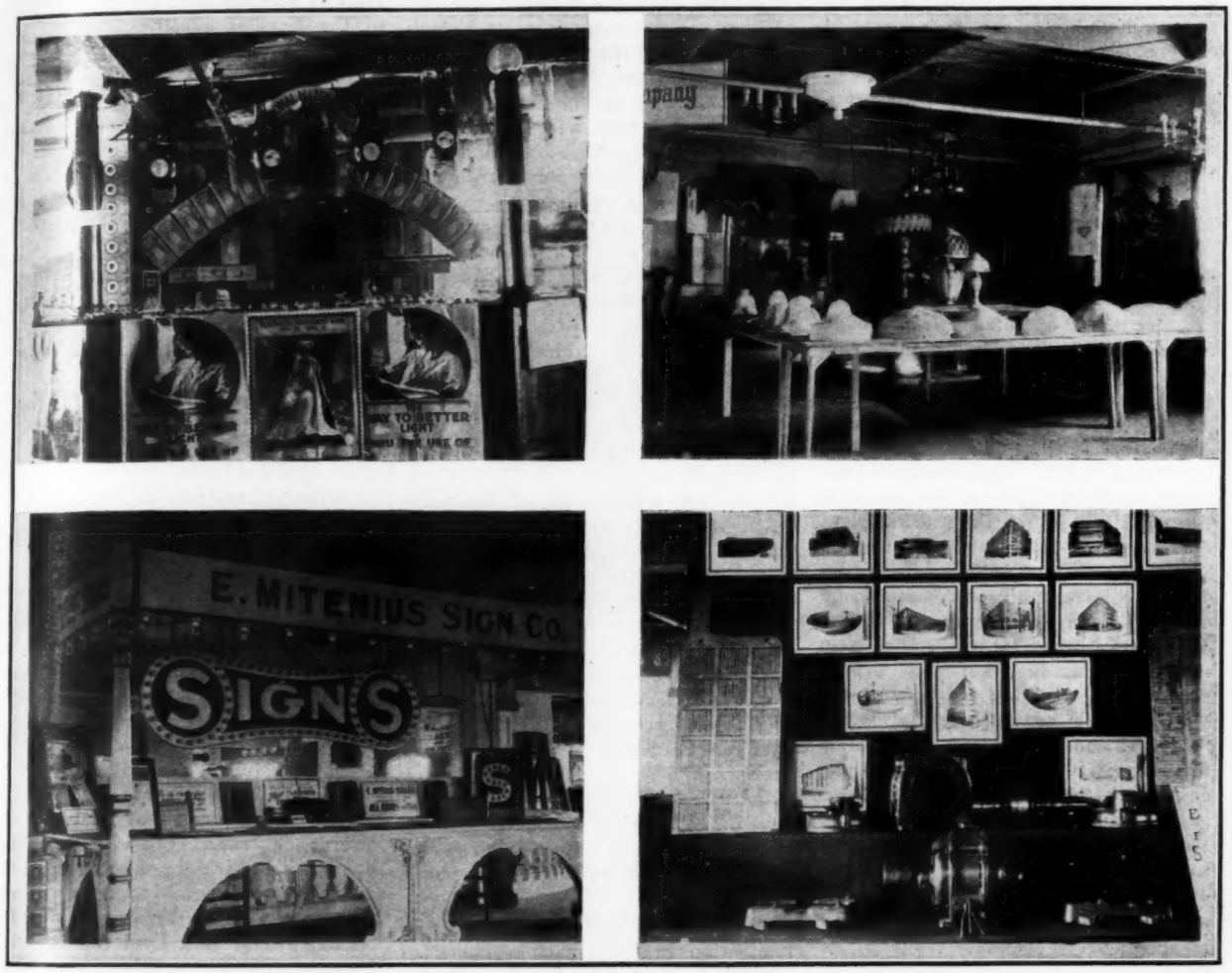


Benjamin Exhibit at Cincinnati Show.

management of the show that very few people in or around Cincinnati did not know what was going on.

The show was formally opened on the afternoon of November 29, over the transcontinental telephone line installed by the American Telephone and Telegraph Company in the main auditorium of Music Hall, by President C. C. Moore, of the San Francisco Exposition. President Moore's remarks, which were heard by 800 persons by means of individual receiver sets invoice and showing the persons of Alexander Graham Bell, Thomas A. Watson, who heard the first telephone message, and other famous personages in the history of the telephone. Interest in the telephone exhibit was perhaps greater than in any other feature of the show, and there was always a large crowd waiting to obtain entrance to the auditorium for the next series of talks and pictures.

The number of exhibitors and the infinite variety of the displays made Power Company, and the Electric Shop demonstrated continuously the wide application of electricity to everyday use in the home, was probably as interesting as any exhibit of the sort ever prepared. At considerable expense and with infinite pains, under the direction of Manager R. E. Flower, of the Electric Shop, who handles the electrical appliance business of the companies referred to, an indoor bungalow was constructed, consisting of garden, living room, dining room,



Views of Electric Show Held at Providence, R. I.

stalled by the company, the largest number ever before installed in connection with the transcontinental line for an affair of this sort, were responded to by President W. W. Freeman, head of the Electrical Show Company and of the Union Gas and Electric Company. The mayor of Cincinnati later took the line and talked with the Ohio Commissioner at the Exposition.

The local telephone company exhibited during the show, in connection with the daily demonstrations staged by means of its transcontinental lines, the famous moving pictures showing the construction of the line, with talking-pictures reproducing the was such that it is virtually impossible to give an adequate idea of the extent of the show, in any detail. As stated above, all of the leading manufacturers of electrical appliances were represented, either individually or through local handlers of their goods, including the General Electric Company, the Western Electric Company, the Allis-Chalmers Company, the Westinghouse Electric and Manufacturing Company, the Walker Vehicle Company, the Warner Elevator Company, the Otis Elevator Company, and many others.

The electric bungalow, by means of which the Union Gas and Electric Company, the Union Light, Heat and kitchen and laundry. These rooms were open to the aisle, being concealed by means of curtains whenever desired.

The "Home Electric," as it was called, was inhabited during the show by a young couple indicated as "Mr. and Mrs. Edison, Jr.," who demonstrated thoroughly to interested crowds how to keep house with electricity. They were served by a colored cook and a French maid. The former prepared in the electric kitchen, where an electric range had the place of honor, a full meal twice a day, the maid serving it in the dining room. Later, the dishes were washed in an electric dish-washing machine. The couple received their friends in the

garden under a pergola, near the pretty electric fountain, and had a chafing dish party, or popped corn in an electric popper. Dancing to the music of an electrically-operated Edison phonograph was also a popular part of the program in the electric bungalow. All of the rooms were warmed by electric heaters, and handsome fixtures and floor lamps gave light, while electric fans kept the air in circulation.

Daily a demonstration of house-wiring was conducted, serving to show not only the facility with which such work can be done, but the attractiveness of an offer now being made by the Union Gas and Electric Company, under which it wires a kitchen, with a drop-light and iron plug, and furnishes an electric iron and an ironing board, for $19, payable at the rate of $1 a month. The demonstration consisted of a visit by a salesman, who explained this offer, and was shortly followed by a man who did the wiring in a jiffy.

A money-washing outfit, consisting of electrically-operated washer and mangle, which laundered soiled currency and returned it as good as new; several exhibits of electric toys and electrically-lighted Christmas trees; a miniature kitchen outfit, operated by two misses of five and seven, respectively, with the aid of a "Western Electric, Jr.," range; the exhibits of the Navy and Marine Corps, attended by detachments of uniformed men under the command of non-commissioned officers; a wireless outfit, in charge of Cincinnati high school students, in constant communication with nearby cities; demonstration of motor-construction and of machine-tool work; "daylight" moving pictures, showing the manufacture of heavy electric machinery in the General Electric Company's plants; and other displays, may serve to indicate the comprehensive nature of the show.

It was in no sense merely an appliance exhibit, as this outline will serve to show, but a complete electrical exposition, showing every possible application of current up to date, and serving as the most complete proof possible of the indispensability and daily usefulness of electricity. This fact, coupled with the heavy attendance and undoubted public interest, indicate the certainty of a very considerable expansion of electrical consumption in Cincinnati, especially by household users of current.

One of the most pleasing features of the week's celebration, from the standpoint of members of the electrical industry, was the great Jovian rejuvenation held at Music Hall on December 1, with Thomas Wynne, of Indianapolis, Jupiter of the National Order, as the guest of honor and principal speaker. Prof. A. M. Wilson, of the University of Cincinnati, who is now Cincinnati Statesman, was toastmaster on this occasion, while B. M. Downs, Statesman-at-large, was another guest. More than fifty initiates were taken into the Order, which has taken a new lease on life in Cincinnati, and is to have a future of unusual activity, due largely to the interest awakened by the success of the week's celebration. About 200 members and guests participated in the rejuvenation and were seated at the dinner in the Music Hall restaurant.

The show was open from 11 o'clock in the morning to 11 o'clock in the evening, every day from November 29 to December 4, the closing day. As stated above, there were over 28,000 paid admissions, with some thousands of others. The admission charge was 50 cents, but the exhibitors were permitted to distribute to friends and customers coupons which reduced the charge to 25 cents, and these were extensively used, especially after news of the attractiveness of the show had spread and public interest was at its height. The charging of this relatively high fee for admission served the purpose of keeping the size of the crowds within reasonable bounds—jamming the building regularly, however—and of giving it a much higher character than would have been seen at a free display. This factor in itself insures extensive benefit to the industry in Cincinnati from the show and the week's celebration as a whole.

Cash prizes were awarded for the best decorated retail stores in the city during the week, and the Devere Electric Company received first prize, the Shannon & Sokup Company second prize, and The Electric Shop, of the Union Gas and Electric Company third award. Decoration was quite general, and gave the city a festive air which aided largely in helping along public interest.

The most conspicuous outside illumination in Cincinnati in honor of Electrical Prosperity Week was that of the Times-Star Building, seven stories in height, which was obtained by means of the use of 3,600 lights of white, red and green, outlining the building, all of its windows, and a great star in the center to indicate the name of the paper. Unusual interest attaches to the installation from a technical working standpoint, as it is believed to be the most extensive ever placed after the construction of a building. The work was done by the Reuter Electric Company in connection with the Quehl Sign Company. Troughs of galvanized iron were used to form the outlines, these being attached to the building by means of small angle-irons through which screws were passed. Receptacles for the lamps were placed in these troughs, eight inches apart. The illustration on page 1071 gives an excellent idea of the effect obtained by the illumination, which will probably be retained permanently, for use on special occasions. The idea was that of Charles P. Taft, the owner of the newspaper.

An unusually beautiful piece of decorative work in connection with the Cincinnati Electrical Show was "the bursting bomb of jewels," which was placed in the main lobby of Music Hall. It was designed by Mr. Glossing, of the General Electric Company, of the same materials as the famous Tower of Jewels at the San Francisco Exposition, and was the first piece of this work which has been seen outside of the Exposition. Six spot-lights of different colors illuminated the beautiful object brilliantly, and brought out its peculiar and delicate grace splendidly.

Louisville, Ky.

More than 8,000 people visited the electrical demonstration and displays at the Armory in Louisville, Ky., on the first night of Electrical Prosperity Week celebration in that city and throughout the remainder of the week the exhibit hall was well patronized by Louisville people. Most of the electrical contractors of the city and all of the important dealers in electrical appliances were represented by booths, and in addition various other lines were represented. All but two of the automobile dealers in the city took space and most of the dealers in pianos and other musical instruments also were represented by displays of their wares. The "1849 California Mining Camp," a carnival proposition, which occupied a portion of the large drill hall, was liberally patronized. Various of the dealers conducted contests, the awards in which provided for free house wiring, while others took orders for well-known makes of lamps at 20 per cent discount from the regular prices. The Louisville Gas and Electric Company conducted a guessing contest; the first prize was $25 in cash to apply on a bill for wiring of the lucky contestant's house. The Harry I. Wood Company supplied toy balloons for the "kiddies" and there were many other novelties.

Other Kentucky Towns.

Smaller Kentucky towns were not backward in staging their Electrical Prosperity Week celebrations. Lexington Jovians in connection with the utility companies and the contractors and dealers, staged a number of elaborate displays while all the stores in the classification were specially decorated for the occasion. At Danville, the Danville Light, Power and Traction Company paid special attention to the period by offering 60-watt Mazda

lamps, not more than 10 to a customer and only then to consumers who called at the company's office, at 20 cents each. During the same period a 10-per-cent discount was offered on all electrical appliances. In Henderson the demonstration centered at the store of the Lambert-Grisham Hardware Company. The display of electrical appliances was elaborate and complete, and the exterior of the building freely decorated with festoons of lamps, while to those who called to see the display were given chances on an electric flat iron, one of which was awarded every evening.

Memphis, Tenn.

The largest celebration in Tennessee was that held at Memphis, where the Jovian Show, held in the old Cumberland Telephone Company's Building, was thronged daily. The first floor of the building was devoted to displays, showing every kind of electrical appliance. Booths lined the walls in which contractors and dealers had displays. On this floor was also shown a miniature Niagara Falls, designed and built by Carl K. Chapin, president of the Memphis Jovian League. A small electric pump handled 4,000 gallons of water a minute. Near the door was a large Ferris wheel carrying appliances. The second floor was devoted to educational exhibits. Moving pictures of progress in the electrical industry were shown and attracted both children and adults. The Cumberland Telephone Company had a switchboard exhibit and the Memphis Street Car Company showed some large motors. The third floor was transformed into an electric house.

Electric Show at Memphis, Tenn.

Concealed lighting was used, with sunlight globes. The power for the exhibit was furnished from two stations, in order to reduce the danger of break downs.

Two visitors at the opening were W. N. Matthews, Past Jupiter, and Ell C. Bennett, reigning Mercury, of the Jovian Order, both of St. Louis.

Nashville, Tenn.

At Nashville, the celebration was of a "cash in" nature, as described by a member. The Nashville Railway and Lighting Company co-operated with 13 contractors in pushing a house-wiring campaign, featured by bargains in installation, a $1-a-month system of payment and free lighting to February 15. The contracts were turned over to the contractors in rotation. The company carries the account and the reduction is split between the contractor and the company. The company also placed stocks of appliances with 30 drug stores and dealers on consignment. All of these were required to have window displays. Between 400 and 500 houses were wired and a large business was done by all dealers in appliances.

Providence, R. I.

An electric show, under the auspices of the Narragansett Electric Lighting Company, was the feature of Electrical Prosperity Week, at Providence, R. I. This was held at the Rhodes Pavilion, on the Pawtucket River. Dancing was a feature, and $150 in electrical prizes were awarded to the three most proficient couples each evening.

Moving pictures were given between dances, with the following films, all bearing on electrical subjects: "Back To The Farm," "A Twentieth Century Courtship," "The Electrical Education of Mr. and Mrs. Thrifty," "Schenectady Works of the General Electric Company." During intermissions electric coupes were run about the floor by young ladies.

New England Cities.

The Manchester (N. H.) Traction, Light and Power Company offered a reduction of 20 per cent on the price of standard Edison Mazda lamps, and one of 10 per cent on all electrical merchandise. In a full-page advertisement, the company called attention to the fact that it embraces about all the electrical industry of the city, except for the telephone company. It has under construction $800,000 worth of plant extensions, which includes a 10,000-horsepower generating station at Kelley's Falls, a steel-tower transmission line about 10 miles long, three substations, and a large amount of underground work in the city.

Portsmouth, N. H., inaugurated a white way enterprise by which the Rockingham Light and Power Company will furnish energy to 24 additional three-lamp groups, each having 100-watt Mazda units, at the same total price as under the past contract, $11,500 per year. The city buys the posts, which will cost about $21 each, and the company installs them.

The Brockton (Mass.) Edison Company offered four combination sets of domestic appliances, each set including a coffee percolator, at about $11 each, $2.50 down and the balance in three monthly payments. A $3 Thermax flatiron was given as a souvenir free.

The Haverhill (Mass.) Electric Company exhibited many of the latest electrical devices at its store.

The Lowell (Mass.) Electric Light Corporation featured electric vacuum cleaners.

The Cumberland County Power and Light Company, Portland, Me., held a special demonstration of domestic appliances, offering toasters, etc., at reduced prices. Music was provided at the salesroom.

The Cambridge Electric Light Company featured an easy-payment house-wiring plan, by which the company will finance the installation of ten lights complete with fixtures and glass at $57.50, additional lights with switches, to be $5 each. Five Cambridge contrators are given the contracts to execute.

The Worcester Electric Light Company united with other electrical interests in the city in special lighting, advertising and wiring activities.

Prosperity Week at Lynn, Mass., was celebrated with the flood lighting of the City Hall, Public Library and other buildings and by an exposition at the Alfred Cross Company store, in which the Lynn Gas and Electric Company, the General Electric Company and local electrical dealers participated. The central station had an extensive demonstration of domestic apparatus, and the General Electric Company exhibited testing, measuring and standardizing devices used in its Lynn factory, which is one of the largest branch factories of the company. One exhibit was a sphere spark gap rated at 180,000 volts.

The Rutland (Vt.) Railway, Light and Power Company featured its house-wiring campaign and the A. S. Reed Electric Company and Marsden Electric Company had fine window exhibits.

Pittsfield, Mass.

Electrical Prosperity Week was observed at Pittsfield, Mass., by an ex-

position in charge of the Jovian Order. The following were the exhibitors: General Electric Company, Pittsfield Electric Company, J. & B. Company, New England Telephone and Telegraph Company; J. Cooney, Jr., dictaphones; G. D. Meserue, thermostats; Pittsfield Radio Club, demonstration of wireless telegraphy; Rice & Kelly, bed room appliances; M. D. MacDonald, electrical appliances.

The exposition building was flood lighted and England Brothers' block was decorated with 1,400 colored incandescent lamps.

Boston Vehicle Interests Take Advantage of Prosperity Week.

Boston's most successful electric truck parade occurred November 30, in connection with Prosperity Week. Ninety-six vehicles, representing about 40 industries of Greater Boston, were in line, the parade being over a mile in length. The route was through the business district.

A five-ton truck of the Boston Edison Company containing the First Corps Cadet Band led, and C. A. White, of the Edison Company was chief marshal, with C. H. Miles, E. S. Mansfield and Day Baker as assistants. The Edison Company had 12 trucks in the parade; the General Electric Company, three; Cambridge Electric Light Company, five; American Express Company, four; Malden Electric Company, two; Suburban Gas and Electric Company, two; Lawrence Gas Company and Worcester Electric Light Company, one each; other industries represented were dry goods, lumber, ice, coal, publishing, spring water and dairy companies. A vehicle of particular public interest was an electric ambulance for disabled horses, owned by the Massachusetts Society for the Prevention of Cruelty of Animals.

In the evening a dinner and meeting of the New England Section, E. V. A., was held at the Thorndike Hotel, with 40 men present. J. T. Day, of the Malden Electric Company, presided. E. S. Mansfield gave a résumé of the work of the association during the past year; Day Baker, of the General Vehicle Company, New York, read an interesting report of the Cleveland convention, and S. G. Thompson, of the Public Service Electric Company, Newark, N. J., spoke on the growth of the electric-vehicle industry since its inception and showed that the field is now developing more rapidly than the electric power business. Interesting figures, indicating the remarkable accomplisments of commercial vehicles in various forms of activity were presented. Others who spoke were F. J. Stone, Electric Storage Battery Company; Day Baker; W. E. Eldridge, and W. E. Holmes, of the Cambridge Electric Light Company.

H. H. Skinner, of the Narragansett Electric Lighting Company, Providence, R. I., said that his company was furnishing free current to electric car owners attending the electric show in that city.

Kansas City, Mo.

Electrical Prosperity Week was celebrated in Kansas City by the decoration of many windows of merchants, as well as of electrical contractors and supply dealers, with designs of which the poster of the Society was the central feature. The use of electricity in ultra-modern ways was particularly emphasized. One music company, for instance, showed the electrical operation of a player piano. A physicians' supply company exploited a new form of ear trumpet which is operated by a small battery, the device being first shown in Kansas City on November 29, and met a remarkable early sale, chiefly because it was introduced in conjunction with the emphasis on electricity that day. The Kansas City Electric Light Company helped materially to the success of the week, sending pamphlets to nearly every citizen and all users of current, displaying the streamers on its trucks, and securing the display of posters on all street cars of the Metropolitan Street Railway Company. The central station and several contractors and jobbers took a page display in the newspapers.

A rejuvenation was held the evening of December 3, at the Coates House, at which 21 candidates were received. The ceremonies were conducted by A. Penn Denton, First Tribune; J. D. Todd, Second Tribune, and P. Lloyd Lewis, Statesman. More than 20 Jovians from out of town participated, some of whom were present in Kansas City for the convention of the Western Ice Manufacturers' Association.

The first event of Prosperity Week was a meeting of the Kansas City Association of Credit Men, devoted to that subject, at which an address was made by F. B. Uhrig, manager at Kansas City, of the Western Electric Company. Mr. Uhrig outlined the growth of the industry; and, for the benefit of the profession present, mentioned the wide range of credits which a credit man of an electrical supply company or contractor must be familiar with, ranging from small, new contractors to the United States Government.

In Topeka, besides the decoration of establishments offering electrical service, there was a session of the Topeka Rotary Club, devoted to the subject, the meeting being at the club rooms of the Topeka Railway Company, and Albert M. Patten, A. H. Purdy and E. L. Overton being hosts. Mr. Purdy, manager of the Topeka Edison Company, gave an address on "Electricity and Prosperity," calling attention to the use of electricity by 70 per cent of the people of the nation, and suggesting the hiatus in prosperity without electricity.

In Springfield, Mo., the Young Men's Business Club offered prizes for the best window displays featuring uses of electricity, contractors in electrical work being barred; there was a fare refund offer by merchants to increase business and visiting to the town, and very important support for the idea of the week by the local newspapers. The Springfield Gas and Electric Company entertained a large number of visitors at its power plant, who came on special permits issued for the week.

In St. Joseph, Mo., there was pronounced co-operation in the work of the week by the Commercial Club, of which H. C. Porter, commercial manager of the light and power company, is vice-president. There was hardly a window in St. Joseph's business district that did not exploit electricity.

Salt Lake City, Utah.

Electrical Prosperity Week in Salt Lake City was voted as a complete success. Many lessons were learned from this first year, which will be of value in subsequent campaigns. Of course, so far as the public is concerned, the effect will be accumulative. This year an excellent foundation has been laid. The public have gotten the idea of what Electrical Prosperity Week means and another year they will grasp it with much more enthusiasm.

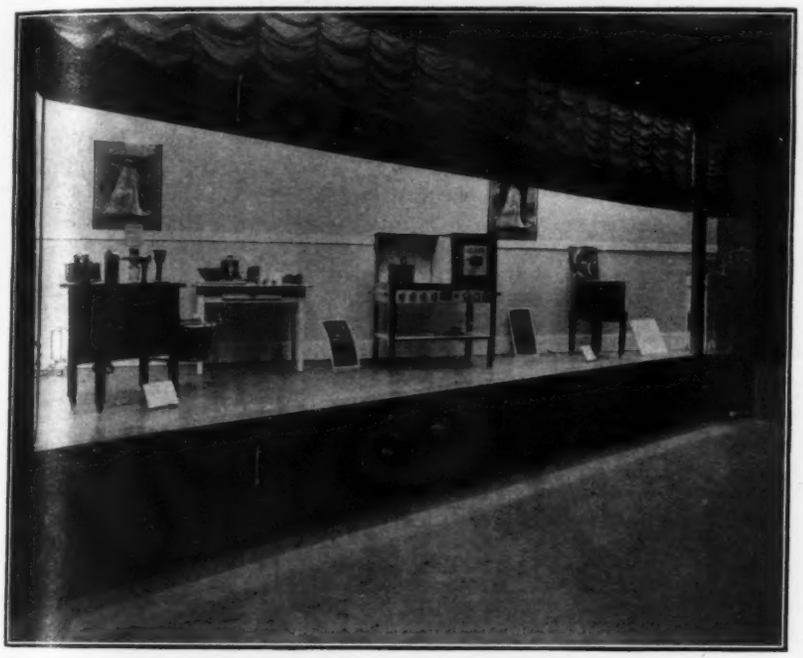
Early in the campaign, the proposition to carry a double-page spread was put up to each of the newspapers, and this whetted their appetite for news. Considerable advance publicity was obtained on the meetings of the committees covering their plans for the week. On Sunday, November 28, the double-page spread was run in three of the daily papers, the fourth scattering their advertisements through the issue. The Utah Power and Light Company, four jobbers and several electrical dealers and hardware stores, were represented on the page. Most of the department stores who carry electrical specialties made a feature of their electrical line in their regular pages.

The principal merchandising feature of the week was the 10 per cent discount offered by all dealers in electrical supplies on their entire lines, except lamps. This especial discount was featured in all of the advertising; special cards were run in the street cars during the week announcing it, and the regular banner furnished by the Society for Electrical Development was carried on the fenders of the street cars.

The Utah Power and Light Company erected a rustic booth on its sales floor and an attractive young lady presided at this booth during the week serving electric delicacies. Special demonstrations were also maintained by several of the dealers.

The regular luncheon of the Rotary Club was devoted to a review of electrical progress. W. C. Orem, who is president of the club, is president of the Orem Lines, an electric interurban system operating in Salt Lake and Utah counties. Being a member of the clan, therefore, he introduced the speakers in a frank and outspoken manner, throwing some side lights on their previous history, which had not hitherto been generally known. D. C. Green, manager of the Salt Lake Division of the Utah Power and Light Company, told of the rapid strides which electricity had made during the past few years in the field of power generation, transmission and distribution. C. B. Hawley, vice-president and manager of the Inter-Mountain Electric Company, told of the progress in electrical apparatus for the utilization of electricity, particularly with reference to electrical appliances and lighting systems for the home, office and factory. Electricity in the field of transportation, was discussed by H. L. Beach, general manager of the Utah Light and Traction Company. He reviewed briefly the history of electric transportation and compared the earliest electric cars with the latest passenger and freight motors. A. H. DeNike, manager of the Utah Division of the Mountain States Telephone and Telegraph Company, told of the remarkable strides made in the field of telephony, during the past year, commenting particularly on the part which the company's inter-mountain division played in the transcontinental telegraph line recently put into commission.

The regular weekly luncheon of the Utah Electric Club was given over to a celebration of Electrical Prosperity Week. Not to be outdone by the enthusiasts for Utah products, who had an "All Utah Products" luncheon the week before in celebration of Utah Products Week, the electrical men had an "All Electrical" luncheon in celebration of Electrical Prosperity Week. Several electrical delicacies, not commonly found on bills-of-fare were served.



Cooking and Kitchen Appliances in Commonwealth Edison Company's Show Window.

R. E. Richardson, of the Electric Bond and Share Company, of New York City, spoke on electric rates and their influence on load building. He laid special emphasis on the fact that the public should be educated to understand that by far the larger part of the charge made to them for electric service covers interest and depreciation on an investment in equipment, which the company has bought and loaned to them for their use, thereby relieving them of the necessity of making the investment for themselves and for a service rendered in looking after that investment and that only a small part of the charge is for the kilowatt-hour which they use.

Seattle, Wash.

The Puget Sound Traction, Light and Power Company, of the Stone & Webster interests of Boston, and the municipal lighting plant of Seattle, were the moving spirits in the celebration. However, the electrical supply houses and department stores of Seattle did everything in their power to make the celebration a memorable one and a decided success.

The Puget Sound Traction Company was ably represented by H. J. Gille, acting for President A. W. Leonard and the municipal lighting plant by J. D. Ross, superintendent of lighting. The electrical supply houses were represented by their managers or superintendents.

The main exhibition of electrical appliances was held in the Stuart Building, where the various firms exhibited and demonstrated the latest electrical equipment before large throngs which congested the display rooms throughout the week. The quarters were open from 2 o'clock in the afternoon until 10 o'clock in the evening each day of the week. Every supply house in the city of Seattle maintained a booth at the exhibit, as well as splendid window displays at their various places of business. In connection with the exhibition and storeroom displays, a general educational campaign was conducted by means of newspaper publicity, billboards, banners and every available method of advertising.

Chicago.

In Chicago the principal aim was to popularize electrical domestic appliances. The Commonwealth Edison Company supplemented its regular newspaper advertising by special announcements offering a discount of 10 per cent from the regular price on any appliance purchased during the week. Special inducements were also made to secure house-wiring contracts, a premium being given to each new customer who signed during the week. The established policy of the company of allowing two years to pay was not changed during this period. In all display rooms and stores special signs and posters were used.

An event of the Week was a prize essay contest, open to high-school students, with three prizes offered to the three best essays on Electricity. Over 500 manuscripts were submitted during the Week. The prizes which were offered by the Edison company were gold pieces and electrical merchandise.

Several of the local dealers and department stores conducted special sales during the Week and many show windows were devoted to electrical displays.

The *Chicago Evening Post* on Monday, November 29, published a four-page electrical section containing a number of interesting articles dealing with electricity and its uses in the home, store, office and factory. Electrical Prosperity Week was described and its objects clearly set forth with the view to gaining the co-operation of the public in recognizing electricity and things electrical.

Chicago Electrification Report.

The complete electrification of the Chicago railroad terminals as a means of reducing smoke, according to the report of the Chicago Association of Commerce Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals, which, after four years of work, was formally delivered to the Association last week, is technically practicable, but financially impracticable. The finding upholds the railroads in their contention that complete electrification would create an impossible operating deficit, but disproves the assertion that electrification is impossible because of physical obstacles to the installation of, and operation by, either the third-rail or overhead-trolley systems. Moreover, in delivering the report, members of the Committee, which includes four representatives of the city, four of the railroads and nine from the Association of Commerce, assert that while complete electrification of all roads is financially impracticable, there is nothing in the report to indicate that the electrification of certain roads is not feasible and financially warranted.

The report of the Committee was completed a year ago and has now been printed as a volume of 1,177 pages. It is made up of six parts, dealing respectively with the necessity for electrification of Chicago's railroad terminals, technical feasibility and cost, results to be anticipated, financial practicability, summary of conclusions on electrification and summary on atmospheric pollution. An appendix occupies over 100 pages. There are 505 tables and 719 illustrations, including maps. The chief engineer was W. F. M. Goss, dean of the engineering school of the University of Illinois. The chairman of the committee was Judge Jesse Holdom.

The report was formally presented to the Association of Commerce on December 1, at a dinner at the Congress Hotel. Addresses were made by President C. L. Dering, Harry A. Wheeler, Harrison B. Riley and Judge Holdom.

Action on the subject of electrification by the City Council of Chicago was agitated some years ago but was deferred until the completion of the Committee's labors. At the session on December 6, however, the Council by unanimous vote directed the Committee on Railway Terminals to prepare ordinances at once for the purpose of compelling the railroads to electrify.

The Committee of the Association of Commerce finds that the minimum cost of an electrification to bring about smoke abatement would be $178,127,230. This would provide for the joint electrification of all trackage within the city limits and such extensions beyond as are unavoidable because of operating conditions. This investment would entail an increased annual expense, including interest and depreciation, of $14,609,743. Moreover, the Committee sets forth the fact that the roads would have to add $96,313,409 to the minimum total to provide for betterments and rearrangements of yards and other properties to meet the new operating conditions. This would bring the total cost up to $274,440,630.

WHY CHICAGO RAILROADS CANNOT ELECTRIFY.

Electrification would ultimately cost	$274,440,630
The 600-Volt Direct-Current (Third-Rail) System, minimum plan, would cost	197,908,000
The 2,400-Volt Direct-Current (Trolley) System, minimum plan would cost	191,666,808
The 11,000-Volt Alternating-Current (Trolley) System, minimum plan, chosen as the least expensive, would cost, in detail:	
Power station	10,302,104
Transmission system	1,618,693
Substations	2,024,736
Switching stations	573,073
Contact system	28,141,188
Bridge warnings	1,071,989
Return circuit	4,446,033
Elimination of inductive effects and electrolysis	996,727
Telephone system	272,052
Electric locomotives, multiple-unit equipment, work and inspection equipment	91,703,557
Spare parts	485,343
Changes in overhead structures	834,261
Changes in wire lines	2,028,007
Changes in signal system	6,111,407
Removal and re-establishment of locomotive terminals and new facilities	37,293,746
	$187,902,916
Less salvage on equipment usable elsewhere	9,775,686
Net cost of Committee's minimum plan	$178,127,230
Plus added costs due to betterments, improvements and changes precipitated by electrification	96,313,409
Estimated total final cost	$274,440,620
Annual charges on investment of $187,902,916	16,946,436
Annual saving through decreased costs of operation	2,336,693
Annual deficit	14,609,743

The report of the Committee, contrary to the opinion held by most of its members at the time the investigation began, finds the steam locomotive guilty of but a small fraction of the damaging smoke. Its elimination, the Committee finds, if other sources of pollution were not reduced to a minimum, would produce hardly noticeable results. Hundreds of observations, tests and analyses have demonstrated to the members, according to their report, that high-pressure steam plants are the greatest producers of air pollution, that metallurgical and other similar manufacturing furnaces come second and that the steam locomotive is third in summer and fourth in winter, dropping then below domestic fires. The report also points out that visibility of smoke, which heretofore has been the sole object of complaint and regulation, is a matter of secondary importance, injury to animal and vegetable life and to property being due almost wholly to the invisble gases and the solids emitted. This being the fact, some of the worst offenders proved to be stacks that never send up visible smoke.

High-pressure steam plants were found to produce 44.5 per cent of all visible smoke emitted within the city limits Metallurgical and other manufacturing furnaces produce 28.6 per cent, steam locomotives 22 per cent and domestic fires 3.9 per cent (from 15 to 20 per cent during three winter months). Of the total solids in smoke, metallurgical and similar furnaces are guilty of contributing 64 per cent, high-pressure steam plants 19 per cent, domestic fires 8.6 per cent and steam locomotives 7.5 per cent. Of the total gaseous pollution of the air 45 per cent is due to high-pressure steam plants, 23 per cent to domestic fires, 21 per cent to metallurgical and other furnaces and 10.3 per cent to steam locomotives. Steam vessels and gas and coke plants produce negligible quantities of smoke.

The Committee finds that domestic fires, including furnaces in apartment buildings, produce 57 per cent of all the soot or tarry products of combustion discharged into the atmosphere of Chicago and, for this reason, constitute the most objectionable source of atmospheric pollution in the city. Soot is shown to be damaging to clothing, property and vegetation.

The Committee finds that electrification would reduce the total amount of visible smoke in the city and its immediate environs only 20 per cent, the total gaseous pollution only 5 per cent and the total solid pollution less than 4 per cent. This is due to two facts:

(1) Of the total pollution of the air only two-thirds is due to combustion. The other third is dust from the general activities of the city.

(2) Electrification would do away with locomotive smoke but the power house built to furnish the electricity would offset some of the gain. It is shown, for instance, that this power house would produce nearly half as much gaseous pollution as locomotives do now. The final net reduction from the 22,400,000 tons of fuel consumed would be only 1,290,000 tons.

The significance of even the small gain to be expected from electrification is lessened, according to the report, by the fact that industrial pollution is growing rapidly whereas steam locomotives are yearly producing relatively less smoke.

As a result of its study of Chicago air pollution the Committee recommends, as the only means of bringing about genuine improvement, a permanent municipal pure-air commission. This commission should be authorized to employ experts, should have ample funds for carrying on scientific investigations and have authority over every source of air pollution. The Committee believes that air purification is what the

people want, not electrification, if that electrification will not bring the result demanded.

When this Committee began its investigations some of its members had an idea that by electrifying two or three of the lines that were most conspicuous by reason of their suburban service, the air would be pretty well freed from soot and cinders. So they tackled the steam suburban service, but found that all the suburban trains in Chicago contribute only 1.54 per cent of the total visible smoke, 1.97 per cent of the total dust and cinders of smoke and 0.74 per cent of the total polluting gases.

Chicago burns more coal per capita than any other large city, the figure being 8.3 tons as compared with five tons for Cleveland, four each for Manchester and Leeds, England, three for Hamburg, Germany, two for Paris, France, and 1.5 for Berlin Germany. The loop is the smokiest part of the city, burning in 1912, 397,167 tons of coal per square mile. The stock yards district followed with 245,919 tons and South Chicago was next with 224,991 tons.

The three most injurious elements in smoke were adjudged to be sulphurous gas, mineral dust and soot. Chicago's coal is high in sulphur, so that large quantities of sulphur gas must always be liberated, improvements in methods of combustion having little if any influence on the volume of gas produced. Steel mills, foundries and similar plants were found guilty of producing the large part of the mineral dust, 41 per cent of their contribution being from the matter treated and not originating in the fuel. Chicago air, it was found, is annually polluted by 304,391 tons of solid matter from chimneys, 179,511 tons of which is of fuel origin.

When compared with the air of London, Berlin, Manchester, Glasgow, Cleveland and other large cities, Chicago air was found to be the best. High average wind velocity and heavy, well-distributed rainfall contribute to this. Chicago enjoys an annual average of sunshine of 57.4 per cent, which is better than Philadelphia, Pittsburgh, Scranton, Washington, Cleveland, Detroit, Toledo and Buffalo, and almost as good as Boston, New York and Omaha.

In regard to electrifications in other cities and countries it was found that none had ever been undertaken for the purpose of reducing air pollution where terminals were otherwise satisfactory. Of the fifteen American installations, nine were found to have been undertaken because of operation in subways and tunnels, one as an experiment to test out economy in long-distance service, two to hold suburban business, one because of charter requirements and two to utilize cheap water power. Of foreign electrifications practically all were found to be confined to light passenger business, much of it interurban in character.

The members of the Committee, at the beginning of their work, had been impressed by the electrification of the New York Central, the Pennsylvania and the New Haven in New York City. It was felt that the roads there had shown electrification to be practical and within their means by voluntarily undertaking the improvement. But a study of the New York electifications has shown the Committee, according to its report, that the cases are not parallel. In the first place, it is pointed out, the New York work was not undertaken as an electrification. Electrification was a necessary factor in a great new terminal plan. The Pennsylvania road wanted a great passenger station in the heart of New York City. The only way was to go through miles of tunnel under the North River across Manhattan and under the East River. Electric operation was the only solution. The other two roads had been compelled to electrify on account of their tunnel approach to the terminal.

The situation in Chicago, on the other hand, it is pointed out, is very different. The roads have no reason to incur the expense of electrification because their terminals are already established and there are no tunnels.

But the thing which complicates the situation in Chicago, as the Committee explains, is the vast amount of switching and freight work to be done. In New York the electrified roads are clean, direct tracks for passenger service, uninterrupted and unincumbered by a clutter of freight and transfer business. In fact, the Committee finds that switching and freight handling have never been attempted electrically on any large scale. The Giovi road in Italy is the only foreign road to try anything of the kind. The New Haven road in this country operates three freight yards in part by electricity, but largely, so far, as an experiment. This experimental freight handling requires about 90,000 electric locomotive-hours a year and amounts to about 2,500,000 car-miles. The freight traffic of the Chicago terminals aggregates approximately 3,430,000 locomotive-hours per annum and approximately 164,400,000 car-miles.

Of the total locomotive-mileage within Chicago, freight and passenger switching, or transfer, accounts for 59 per cent. Yard freight-switching service, on the basis of car-miles, it has been ascertained, is more than sixty-five times as great as that on all existing electrified steam roads in America. The Chicago mileage involved by complete electrification would be nearly twice that of all other electrically operated steam mileage in America and, exclusive of foreign light lines resembling interurbans, about 15 per cent greater than all existing electrifications in the whole world. The number of electric locomotives that would be required would be four times all those now in service in America and 2.5 times those in all countries. Thirty-eight roads would have to electrify here, whereas in the world outside Chicago only 37 roads have electrified mileage. Some of the Chicago roads are solely freight roads, having all their mileage within the district and would have to be practically rebuilt.

Notwithstanding the physical difficulties, the Committee, contrary to the opinion of many railway engineers, holds that electrification on its technical side could be accomplished. The third-rail system was found impossible of application because of the very large number of gaps in the conductor necessitated by complicated trackage and by street crossings and other obstructions. The trouble with the overhead-contact, or trolley system, was found to be the number of low structures over tracks. The clearance, where men are to be allowed on tops of cars, is figured at 25 feet, as room must be left for the tallest man on the highest car to swing a lantern. Where employees are not allowed on cars, trolley operation is reported to be possible with a 16.5-foot clearance. The Committee found several hundred obstructions that would prevent men riding on cars. Only a part of these can be raised. A group of railway officials held that the Chicago terminals could not be operated if brakemen were excluded from the tops of cars, but the Committee rules that some new system of freight handling could be devised.

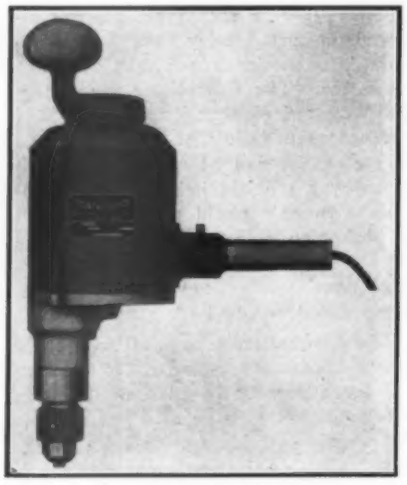
The Committee's cost estimate is a smoke-abatement estimate. If the idea had been merely to plan an efficient electrification, it is pointed out, the estimate of cost would have been different. Much of the most expensive and least remunerative trackage could be left under steam operation. But when the one object of electrification is smoke abatement, it was held necessary to electrify every mile of line within the city. It is held, by railway practice, to be impossible to operate suburban trains while in the city by electricity and over the rest of their run by steam. The total mileage, therefore, involved in the Committee's plan, is 3,476 of which 1,476 is main track. Of the total, 37 miles cannot be electrified by any system and would have to be operated by some type of self-propelling motor. The Committee reports that many of the roads, if required to electrify, would feel it necessary to far exceed the above estimated mileage.

New Electrical and Mechanical Appliances

Small and Light-Weight Electric Drill.

The Standard Electric Tool Company, Cincinnati, O., has developed and is now placing on the market the "Midget" drill shown in illustration. This tool is very light in weight and made in three sizes. The three-sixteenth-inch size weighs 6 pounds, the one-fourth-inch size weighs 7 pounds and the five-sixteenth-inch size weighs 8 pounds.

The armature runs in ball bearings which are incased in grease in dust-proof chambers and the motors are impregnated in Bakelite. The chuck spindle is fitted with thrust bearings. A quick-make-and-break switch of the plunger type is located in the side handle. This places the drill under the operator's control at all times. The motor is force ventilated by means of a high-power fan.



New "Midget" Electric Drill.

This tool is designed and constructed on the unit plan consisting of only five simple units. All electric wires, connections and brush-holders are contained in the frame. Both end caps can be taken off and the tool easily dismembered without disturbing any electrical connections whatever. All gears are generated from a special steel.

Although this tool is very light in weight it is very rigid in its design and construction and its manufacturer states that it will stand the most rigorous continuous service.

The "Fire Fly" Electric Battery Lamp.

The "Fire Fly Light," manufactured by George K. Burleigh, Penacook, N. H., has many new features as well as being very attractive. The case, which contains an ordinary dry cell, is enameled red, the fiber disk which covers the battery is white, the handle blue. The two tungsten lamps are operated from one switch, and by mirror reflection, more light than any single light is obtained. It gives a diffused and not a concentrated light so that by placing it in any corner of a small room, one can read in any part of the room. Other new features are that if anything happens to one of the lamps, one always has the other in use, and the U-clip shown in the cut, which slides up between battery and battery case can be screwed to the floor of an automobile or carriage in any safe place, and the light can be pulled off the clip instantly to measure gasoline, read signboards, make repairs around motor, etc.

New Battery Lamp.

The second illustration shows in use the strap furnished with each light for hanging it around the neck with battery buttoned inside the coat, when putting on tires, or at any time to give the free use of both hands. In this way it is especially useful in looking after the furnace, by the farmer pitching down hay or milking cows, by firemen rushing from one room to another and carrying occupants overcome by smoke, etc., in each case always giving free use of the arms. It is excellent for use as a lantern by children and elderly people. Each outfit is furnished complete with a battery, and packed in a strong wooden box, the whole weighing about four pounds.

High-Voltage Direct-Current Generator.

The Physikalisch-Technische Reichsanstalt, Berlin, Germany, has had built a 10,000-volt, 10-kilowatt, direct-current generating set to be used for experimental and testing purposes. Two units are driven by a common motor, and may be connected in series or parallel. The insulation is such that either terminal may be connected to the frame when in series. The set was built by the Allgemeine Elektricitäts Gesellschaft.

Each machine has a double commutator and two sets of brushes. There are 212 commutator segments, giving about 24 volts between segments.

"Fire Fly" Lamp Hung About Neck of User.

Except for a 22,000-volt testing machine built for the Thury installation in Switzerland, this is said to be the highest voltage for which a direct-current generator has yet been constructed. It is designed along the same lines as ordinary generators, but with higher insulation.

Stow Motor-Driven Flexible Grinder.

In foundries and other shops of the iron and steel industry, where large

Fig. 1.—Motor-Driven Flexible Grinder in Use.

and heavy castings, machine parts, furnace equipment, etc., has to be worked upon, the use of electrically driven portable tools has been found a great convenience as well as economy in time and labor. The cost and trouble involved in hauling the bulky parts to stationary machines is eliminated by bringing the compact and readily portable motor-driven tool to the work. Such portable tools also save a great deal of hand work on castings, etc., since it is now possible to use electrically driven scratch brushes and emery wheels instead of hand brushes and chipping tools.

A new grinder of this type specially designed for use in large foundries and for various branches of the steel industry is shown in Fig. 1. The driving motor is mounted on a strongly built two-wheel truck that can be readily hauled about by means of the detachable shaft. The motor can be tilted back to any angle and clamped at that point. The motor drives the grinding disk through a belt and flexible shaft, the connection to the latter being made at an elevated point in order to relieve the workman of the weight of the flexible shaft. This makes it easier to guide the emery wheel properly. Through the flexibility of the shaft a considerable surface can be worked over with one setting of the motor.

The driving motor shown in Fig. 1 is one of the Stow multi-speed direct-current motors that has for many years found favor for variable-speed work. A plunger in each field core movable by means of the handwheel changes the magnetic reluctance of the field and permits an easy and smooth setting to any desired speed at practically constant efficiency. The motor is very rugged and capable of withstanding sudden overloads. For alternating-current circuits constant-speed motors are furnished to suit the frequency and phase.

This tool is built in several sizes to meet different requirements. It can be used not only for grinding, but by removing the emery wheel a rotary scratch brush may be substituted.

A modified form of this tool is shown in Fig. 2. This is provided with direct-connected flexible shaft, shown equipped with rotary scratch brush. An emery wheel may be used in place of the brush. The driving motor shown in this case is of the constant-speed type and cannot be tilted. It may be swiveled on a vertical axis, however. A cable reel is provided at the front end of the truck.

These tools are recent additions to the very complete line of portable and flexible-shaft tools made by the Stow Manufacturing Company, Binghamton, N. Y. Their large sale shows that they have filled an urgent demand for just such equipment.

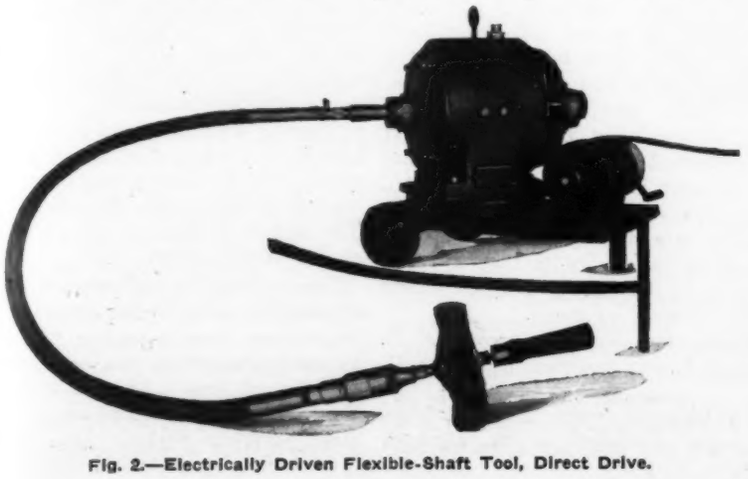


Fig. 2.—Electrically Driven Flexible-Shaft Tool, Direct Drive.

Burr Lighting Equipment for High-Efficiency Lamps.

For industrial establishments and other places where efficiency is almost the primary consideration in a lighting installation, there has arisen a demand for fixtures, reflectors and similar lighting equipment of correct design and construction to permit the effective use of the most efficient incandescent lamps. The equipment must be of durable build and so designed as to be easily installed; it should also preferably be of such design as to involve a relatively small number of parts which are interchangeable and readily adapted for various requirements.

Fig. 1.—Small Reflector Unit.

In line with this demand, the Burr Manufacturing Company has placed on the market a line of lighting equipment known as "Burr Efficiency Units." This equipment includes but a small number of parts which can be interchangeably assembled to secure fixtures for sizes of lamp from 10 to 1,000 watts. This equipment is made in two general types, the small type suitable for lamps up to 100 watts and the large type for lamps from 60 to 1,000 watts. Included in this line is a top holder to which the receptacle is secured and by means of which the fixture is hung; there are also three different types of holders for reflectors and diffusing globes. The reflectors are of three general types, the shallow dome, the bowl and the angle type. Diffusing balls are provided with some of these fixtures where low suspension prevails. The top

holders for the larger lamps are provided with a simple positioning device, by means of which any size of lamp may be used with any size of reflector so as to secure maximum efficiency. The lamp can thus be readily moved up or down to give it the best position with the reflector used. All of these fixtures are very easily wired on account of the simple construction and accessibility of the receptacle terminals. Reflectors and glassware are held in place by a simple latch holder which permits very quick securing or removal of the reflector or globe. All of the fixtures are well ventilated so as to permit the use of even the largest gas-filled tungsten lamps. The fixtures are finished either in heat-treated paint or porcelain fire enamel.

Fig. 2.—Large-Size Burr Reflector Unit.

Fig. 3.—Burr Diffusing Unit.

Of the accompanying illustrations, Fig. 1 shows a bowl-reflector outfit in the small type. In this case the reflector is arranged to be mounted to any standard brass or weatherproof socket by means of a screw-clamp holder as shown, or by means of ordinary 2.25-inch shade-holders. Fig. 2 shows a typical one of the larger units, which in this case is suitable for lamps of 400 to 1,000 watts. The unit shown has a 15-inch bowl-type reflector secured to the top holder by means of the latch adjustment referred to above. This reflector can also be replaced by a shallow-dome reflector or an angle reflector to meet the requirements. Fig. 3 shows a unit in which a diffusing ball is used instead of a reflector. This unit can be used for lamps from 60 to 1,000 watts, several sizes of the unit being provided for various lamps. If desired, a unit similar to that shown in Fig. 3 can be provided with both reflector and diffusing ball. In this case the diffusing ball is held by an extension holder that is easily secured to the ends of the positioning device referred to above.

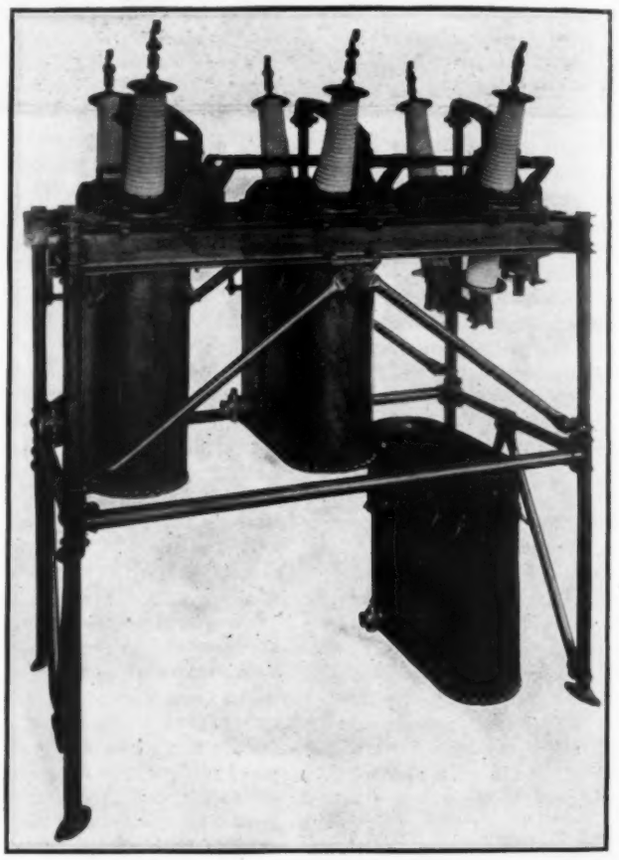
These units are sold through A. B. Wilson, Leader Building, Cleveland, O.

The telephone system of Seville, Spain, is being extended to 22 adjoining towns.

Framework-Mounted Oil Switch for Moderately High Voltages.

The oil switch shown herewith is built for operation at 300 amperes at 35,000 volts, and 300, 500 and 800 amperes at 15,000 or 22,000 volts. It is made up of single-pole self-contained units for hand or solenoid operation.

This switch can be automatically tripped under the usual conditions by instrument-type current transformers, also on overload by high-voltage series coils mounted on insulators above the switch, or in the 15,000 and 22,000-volt sizes by bushing-type current transformers. A series trip can be added to all switches or bushing-transformer trip to the sizes noted at any time. Calibration of the series-trip mechanism is effected at the switch and not at the coil mounted on the high-voltage insulator. Each bushing transformer is mounted inside the oil tank on an iron support supplied with the transformer. The support is bolted to the under side of the switch cover.



Triple-Pole, 35,000-Volt Oil Switch with Series Overload Trip.

The switch is constructed of interchangeable parts. The bushings are single-piece units extending in the oil vessel downward to the contacts below the oil level. The oil tanks are lined with pressboard and are of heavy steel, acetylene-welded. The contacts are of the usual sliding-wedge con-

struction, and consequently have the well known advantages often described for this form of manufacture. The switch opens by gravity assisted by a tension spring. The parting movement of the contacts is rapid when the switch is opened.

Tank lifters for raising the tank the entire distance between the station floor and the switch frame can be furnished. One lifter only is needed for each station. The lifter consists of a simple detachable frame which carries a handle, worm gear, shaft and two drums for winding and unwinding the drums to raise or lower a tank, respectively. The lifter can be operated, removed and replaced on another similar switch by one man without difficulty. This switch is manufactured by the General Electric Company, Schenectady, N. Y.

An Inexpensive Emergency Transformer Outfit.

An ingenious use of material which at first glance would seem to be valueless is shown in the accompanying illustrations of a portable transformer outfit belonging to the municipal lighting plant of Crawfordsville, Ind.

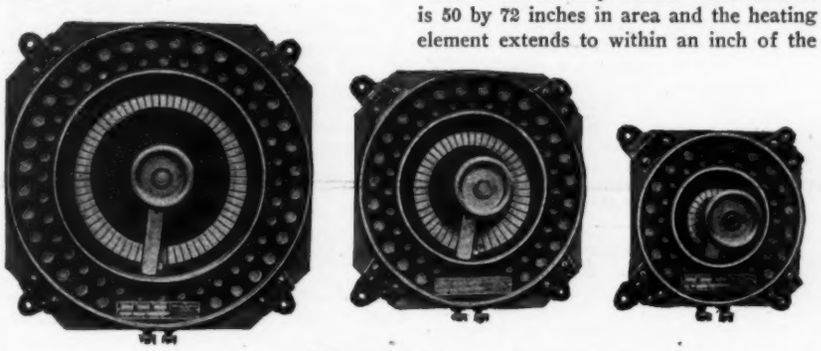
This emergency outfit proved itself of great utility for testing trial power installations, breakdown service, for temporary installations at the county fair, and similar services.

The running gear was originally part of one of the fire engines owned by the city. When the engine was scrapped to be replaced by more modern equipment, the wheels and frame were secured by the superintendent of the electric light plant.

The electrical equipment consists of two Westinghouse single-phase distributing transformers, each of 25-kilowatt capacity. Leads are brought out to the rack so that either single-phase or polyphase current can be obtained at potentials of 110 and 220 volts.

Square-Type Field Rhesotats Replace Circular-Plate Type.

The well known circular-plate type of field rheostats made in several sizes by the Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has recently been superseded by a new line of 6, 9, 12 and 15-inch square plates, which are claimed to be more economical of space. They may be used singly or mounted in tandem, provided with a common operating shaft. Each plate is a complete rheostat with radial lever, contacts and resistance. The resistance wire is reflexed to provide for expansion and to cover the surface adequately. It is fastened to the soapstone base and covered with a special fireproof cement.



Three Sizes of Square-Plate Field Rheostats.

These rheostats are of the "convertible" type provided with a substantial insulated knob on the front of the rheostat and with a clutch member at the rear and may therefore be mounted either on the front or back of the switchboard. If the rheostat is to be mounted on the back of the switchboard a separate handwheel and dial plate must, of course, be employed.

Robinson Electric Blanket.

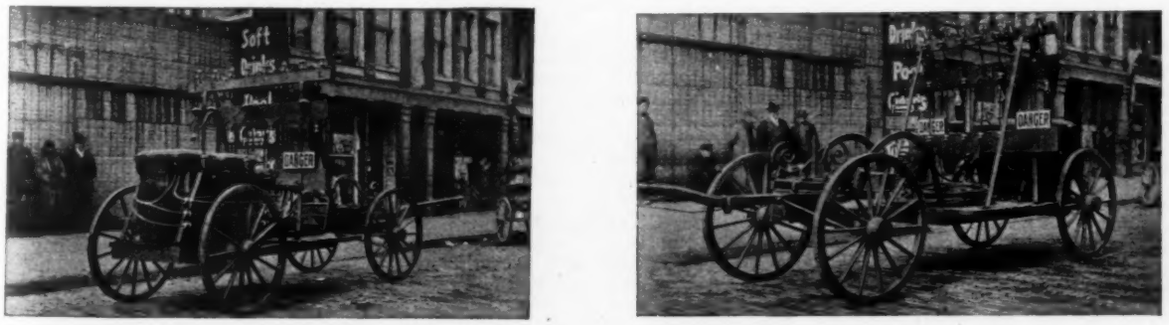
All the prominent health authorities are agreed on the value of sleeping outdoors, or at least in rooms with wide-open windows and an abundance of fresh air. Anyone who has cultivated the practice of sleeping in fresh air under proper conditions realizes the great improvement resulting in general health and in efficiency resulting from its invigorating effects. Except during the few warm months of the year the greatest difficulty experienced with fresh-air sleeping is in keeping sufficiently warm and it is only this inability on the part of most people that prevents this healthful practice from becoming general.

This problem has been attacked by an enterprising central-station man of the Northwest, who felt that electricity could conveniently and economically solve it. The solution was found in the new electric blanket invented by E. G. Robinson, president of the Northwest Electric Light and Power Association. This blanket is made of substantial textile fabrics between which a well protected electric heating element is carefully sewed. The blanket is 50 by 72 inches in area and the heating element extends to within an inch of the edge. A three-heat switch that can be manipulated even in the dark is provided for obtaining three different temperatures, about 112, 102 and 82 degrees Fahrenheit. Each of these temperatures is maintained constantly as long as the corresponding current is on and the blanket is provided with means for preventing excess or dangerous temperatures. With simple precautions it is entirely safe from burns, fire, shock or short-circuit.

Its application is recommended not only for sleeping outdoors or in unheated bedrooms, but for invalids and elderly people and anyone with impaired blood circulation. The blanket is made for connection to 110-volt lighting circuits by means of nine-foot cord and plug provided with the blanket.

The power consumption at the three heats is respectively 170, 110 and 60 watts. High heat is used only when profuse sweating is desired.

This blanket is made by the E. G. Robinson Electric Company, Arlington, Wash.



Two Views of Emergency Transformer Outfit Mounted on Old Fire-Engine Truck for Crawfordsville Municipal Plant.

Latest Approved Fittings

*** The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.**

FIXTURES.—Electro Dental Manufacturing Company, Thirty-third and Arch Streets, Philadelphia, Pa.

Rhein Adjustable Electric Light Fixture for dentist's offices, consisting of a fixture supported by a special cable passing over pulleys on a frame, with counterweight, junction box, switch and supply cord. The special cable consists of four N. E. Code flexible conductors, a steel runner for support of fixture, and outer tape and braided coverings.

Listed November 9, 1915.

FIXTURE PARTS.—Inland Electric Company, 14 North Franklin Street, Chicago, Ill.

Steelite. Protected flexible portable fixtures, made up complete with standard wire and fittings.

Listed November 16, 1915.

FUSELESS ATTACHMENT PLUG.—Peerless Light Company, 800 Adams Street, Chicago, Ill.

Non-separable attachment plug.

Peerless. 660 watts, 250 volts.

Listed October 22, 1915.

HEATERS, Electric.—Majestic Electric Development Company, 428 O'Farrell Street, San Francisco, Cal.

Stationary Electric Air Heaters, consisting of two or more heat units mounted on sheet-metal reflectors and inclosed in asbestos-lined and covered metal frames, designed to be set into ordinary walls, and covered with ornamental cast-iron front pieces.

Style 15, 8.8 amperes, 110 volts; style 30, 13.2 amperes, 110 volts.

Listed November 11, 1915.

PANELBOARDS.—Buffalo Electric Contracting Company, 24 Broadway, Buffalo, N. Y.

Panelboards shown by test and examinations conducted by Underwriters' Laboratories to be in accordance with the requirements of the National Board of Fire Underwriters, have labels attached.

Listed November 1, 1915.

RECEPTACLES, Standard.—E. H. Freeman Electric Company, Trenton, N. J. Freeman porcelain-shell receptacles.

Keyless, 1,500 watts, 600 volts. Cleat type, catalog No. 224.

Listed November 4, 1915.

RECEPTACLES, Standard.—E. H. Freeman Electric Company, Trenton, N. J.

Freeman metal-shell receptacles.

Key, 250 watts, 250 volts.

Cleat and concealed type, catalog No. 195.

Conduit-box type, catalog Nos. 150, 152.

Keyless, 660 watts, 250 volts. Conduit-box type, catalog Nos. 151, 153.

Pull, 250 watts, 250 volts. Cleat and concealed type, catalog No. 22.

Listed November 3, 1915.

RECEPTACLES, Standard. — The Cutler-Hammer Manufacturing Company, Milwaukee, Wis.

"C-H" brass-shell receptacles.

Push-button, 660 watts, 250 volts. Concealed, catalog No. 7550. (See cut.)

Keyless, 660 watts, 250 volts. Concealed, catalog Nos. 7551, 7561.

Listed November 3, 1915.

Push-Button Wall Receptacle.—Cutler-Hammer Manufacturing Company

SHADEHOLDERS. — The Bryant Electric Company, Bridgeport, Conn.

Bryant or Perkins.

Shadeholders, catalog Nos. 521-22; for use with sign receptacles, catalog Nos. 4035, 59108, 61988.

Listed November 5, 1915.

SIGN MACHINES.—Kelley & Kelley, 3193 Boulevard, Jersey City, N. J.

Thermal flashers each comprising a sheet-steel cabinet inclosing a small vacuum tube and an expansion wire. The expansion wire is intermittently shunted across supply line and by its expansion and contraction rocks the vacuum tube back and forth, making and breaking the circuit between platinum contacts and a small amount of mercury within the tube.

Universal Tic Tac Flashers, 125 volts.

One-pole, one-circuit, one-tube; 0.5-12 amperes; catalog No. 622.

One or two-pole, one-circuit, two tube, 0.5-25 amperes, catalog No. 623.

One pole, two-circuit, one-tube; 0.5-12 amperes each side, catalog No. 624.

One or two-pole, two-circuit, two-tube; 0.5-25 amperes each side, catalog No. 625.

Listed October 25, 1915.

SOCKETS, Standard.—E. H. Freeman Electric Company, Trenton, N. J.

Brass shell. Keyless, 1,500 watts, 600 volts, catalog Nos. 53, 54, 55.

Porcelain shell. Keyless, 1,500 watts, 600 volts, catalog Nos. 56-59 inclusive, 65.

Listed November 2, 1915.

SOCKETS, Standard.—Union Electric Company, Trenton, N. J.

Porcelain shell.

Keyless, 1,500 watts, 600 volts, catalog Nos. 522, 523, 524.

Listed November 1, 1915.

SOCKETS, Weatherproof.—E. H. Freeman Electric Company, Trenton, N. J.

Porcelain shell.

1,500 watts, 600 volts, catalog Nos. 60-3 inclusive, 67, 68.

Listed November 1, 1915.

SWITCH BOXES. — The Adapti Manufacturing Company, 919 West Street, Cleveland, O.

Cast-iron switch boxes for use with rigid conduit, catalog Nos. 2501, 2500-T, 2501-T, 2601, 2600-T, 2601-T. Switch-box cover, catalog No. 16.

Listed October 20, 1915.

SWITCHES, Automatic. — United Pump & Power Company, Milwaukee, Wis.

Automatic pressure-regulator switches.

Inclosed, quick-action, spring operated switches controlled by spring-opposed diaphragm and plunger. Alternating-current type, two-pole; direct-current type, single-pole with magnetic blowout in series.

Type 3D1, direct current, 0-6 amperes, 110-600 volts.

Type 3D2, direct current, 6-12 amperes, 110-220 volts.

Type 3A1, alternating current, 12 amperes, 110-220 volts, or 6 amperes, 440-550 volts.

Listed November 8, 1915.

SWITCHES, Push-Button Flush.—The Arrow Electric Company, 630 Capitol Avenue, Hartford, Conn.

Arrow E.

Four-way, 5 amperes, 250 volts, 10 amperes, 125 volts, catalog No. 6803. Also with lock attachment.

Listed November 11, 1915.

WIRES, Miscellaneous.—D. & W. Fuse Company, Providence, R. I.

Deltabeston Fixture Wire.

Solid or stranded conductors, Nos. 14, 16 and 18 B. & S. gauge, having a felted asbestos insulation. This wire is furnished as single conductor with or without an outer silk braid and in twisted pair or twin wire with an outer silk braided covering.

Standard for use in fixtures within buildings, including fixtures for gas-filled incandescent lamps.

Listed November 8, 1915.

Current Electrical News

ATLANTIC STATES.

WESTFIELD, MASS.—The Municipal light board is soon to construct a transmission line to connect the factory of the Westfield Manufacturing Company, which will have an initial installation of about 250 horsepower in motors. A new boiler and equipment will be installed at the generating plant, to take care of the growing power load. W.

ATLANTIC CITY, N. J.—It is reported that a new hotel to cost over $1,000,000 will be erected on the site of the old Windsor Hotel here. Jules E. Mastbaum, Philadelphia, Pa., is interested.

ALLENTOWN, PA.—The Bonney Vise and Tool Company will shortly erect a large addition to its already large plant here. In conformity with its present operation, all machines will be electrically driven. J. Edward Durham, Jr., is vice-president and secretary.

WHEELING, W. VA.—The Wheeling Electric Company may erect a new electric power plant at Tiltonville. Address general manager.

NORTH CENTRAL STATES.

PERRYVILLE, O.—Electric light bonds in the sum of $6,000 will be offered for sale December 27. Address L. W. Truman, village clerk.

URBANA, O.—The Urbana Light Company will run a line to the county hospital and equip the building for the use of electricity, under a contract recently entered into with the county commissioners. L.

ALEDO, ILL.—The condition of the lighting system is unsatisfactory. Address R. E. Ayers, of the Dixon Utilities Company, at Dixon, Illinois.

BELLEVILLE, ILL.—City officials and citizens are conferring on the advisability of establishing a municipal electric light plant. Z.

JACKSONVILLE, ILL.—Plans for a boulevard lighting system on South Main Street are being discussed. Z.

OLNEY, ILL.—The council is considering ways and means to secure electric lights. Address town clerk.

TAMMS, ILL.—The Tamms Ice, Light and Fuel Company has been incorporated. The company has a capital stock of $2,500, and is to generate electricity and manufacture ice for the general public. E. J. Hodges Sr., E. J. Hodges, Jr., and Mildred Hodges are the incorporators. Z.

GRAND RAPIDS, MICH.—The American Public Utilities Company will let a contract of about $1,000,000 soon for hydroelectric generator equipment for a power plant and dam at Wissota, Wis., on the Chippewa River, an improvement costing about $1,400,000. Address Charles B. Kelsey, 401 Michigan Trust Building, manager of company.

MAZEPPA, MINN.—It is proposed to expend $10,000 in purchasing a power site and establishing an electric plant. Address city clerk.

PLUMMER, MINN.—The proposition for the installation of an electric lighting plant carried. Address town clerk.

GUTTENBURG, IOWA.—The town has voted for municipally-owned electric lights. Address town clerk.

OSKALOOSA, IOWA.—South Market Street is agitating the installation of "great white way" electroliers. Address town clerk.

SHARON SPRINGS, KAN.—Electric light bonds amounting to $10,000 have been authorized by vote. Address Harry C. Wheeler, city clerk.

SOUTH CENTRAL STATES.

GEORGIANA, ALA.—The McGowin-Bennett Milling Company will establish an electric light plant. Address W. M. McGowin, president.

WESSON, MISS.—M. L. Culley, of Jackson, Miss., is supervising engineer of an electric light and waterworks plant which is to be constructed here at a cost of $18,000. G.

PAMPA, TEXAS.—The Pampa Water, Light and Power Company has been incorporated with a capital of $5,000, by A. E. Davis, M. E. Davis and others.

PLAINVIEW, TEX.—Charles A. Malone, manager and principal stockholder of the Malone Light and Ice Company, and Judge H. C. Randolph have returned from St. Louis, where they completed the sale and delivery of the properties of the Malone Light and Power Company, including the plants at Plainview, Lubbock and Lockney, to the Texas Utilities Company, a new corporation recently organized in St. Louis, under Texas laws, with the principal offices in Plainview. It is understood that about $230,000 was paid for the properties of the Malone Light and Ice Company, which includes all the transmission lines and other properties of that company in Floyd, Hale and Lubbock Counties. One of the main purposes of the new company will be to develop all kinds of business along electrical lines, such as extensions to the rural districts, to furnish power for feed mills, pumps, for irrigation, as well as for lighting purposes. At present the company is chartered for $250,000, but the plan is to increase the capital stock as the development of the system progresses, and ultimately to make a million-dollar institution. The following are the officers of the Texas Utilities Company: H. Wurdack, St. Louis, president; H. C. Randolph, Plainview, vice-president; E. M. Kurtz, St. Louis, secretary and treasurer; Charles A. Malone, Plainview, general manager.

WICHITA FALLS, TEX.—The property of the Citizens' Light and Power Company has been sold to the Wichita Falls Electric Company.

WESTERN STATES.

CULBERTSON, MONT.—It is reported Donaldson Brothers, of Culbertson, owners of the Culbertson electric lighting plant, will immediately make needed improvements and extensions to the local plant, to care for increasing business. Among the equipment to be purchased are large storage batteries, a new engine, and considerable electrical equipment. O.

WHEATLAND, WYO.—Improvements are contemplated to the municipal electric lighting plant, involving an expenditure of from $6,000 to $10,000. They will include the purchase of a new steam engine and two boilers, bids for which will be called for at once. The installation of a new generator is contemplated in the near future.

ROSWELL, N. M.—The Roswell Gas and Electric Company will install a large steam turbine and make other improvements to its plant, at a total cost of about $20,000. D.

SANTA FE, N. M.—Articles of incorporation have been filed of the Rio Grande Light, Heat and Power Company, a Philadelphia concern, capitalized at $1,000,000. The company proposes to build a dam 112 feet high in White Rock Canyon, and to furnish electric power for lighting and industrial purposes to Albuquerque, Santa Fe, Las Vegas and other cities.

POCATELLO, UTAH.—The new street-lighting district, which will shortly be installed in this city, will cost approximately $52,000. Address city clerk.

KELSO, B. C.—It is understood that the North Coast Power Company is planning the construction of a power line from Woodland to Vancouver. The power line to Kalama is also to be rebuilt.

OLYMPIA, WASH.—Articles of incorporation have been filed with the Secretary of State for the Pacific Power and Development Company, of Mobridge, S. D. The company is capitalized at $1,000,000. O.

SEATTLE, WASH.—A bill has been passed by the city council authorizing the expenditure of $29,750 for extensions to be made during the month of December by the municipal lighting department. Adress H. W. Carroll, city clerk. O.

SPOKANE, WASH.—New contracts for street lighting will be let within a few months. Address Mayor Fassett.

VANCOUVER, WASH.—The North Coast Power Company, which recently took over the southwest Washington properties of the Washington-Oregon Corporation, it is reported, is making arrangements to erect an electric transmission line from Woodland to Vancouver, Wash. The proposed line, according to report, will pass through Ridgefield and

La Center, and will necessitate the rebuilding of the transmission line from Kalma to Woodland. The new line will connect the company's plant at Vancouver with other plants north of Woodland.

EUGENE, ORE.—The city council has under consideration a plant for the installation of an ornamental street lighting system to cost about $1,920.

SUBLIMITY, ORE.—The city of Sublimity has granted C. E. Taylor, of the Stayton Electric Light Company, Stayton, a franchise to install and operate an electric light and power system here for a period of 25 years. The company has also secured a five-year contract for lighting the streets of the town.

LOS ANGELES, CAL.—The Public Service Commission has authorized F. L. Roehrig, architect, to prepare plans and specifications for the central power substation to be erected in Los Angeles, at a cost of $50,000. This station will be situated on city property on the west side of the Los Angeles River, south of Main Street bridge; it will receive electrical energy from the aqueduct power plant and will be the main distributing station in the city.

PARADISE, CAL.—A representative of the Pacific Gas and Electric Company has interviewed the people in regard to furnishing electricity for light and power purposes. Nearly all local residents have signed up for lights, and the work of erecting poles and stringing wires will soon begin.

SAN MATEO, CAL.—W. B. Lawrence, superintendent of the Spring Valley Water Company, has submitted a proposal to the Board of Supervisors offering to supply electricity to the County Farm and Hospital. The company is contemplating the erection of an electric transmission line from San Mateo to its plant at Crystal Springs Lakes. The cost of the proposed line is estimated at $2,700.

PROPOSALS.

POWER HOUSE.—Sealed proposals will be received at the office of the United States Engineer, Wheeling District, Wheeling, W. Va., until January 6, 1916, for building a fireproof power house at Dam No. 14, Ohio River. Further information may be had on application to the above-named office.

ELECTRICAL EQUIPMENT.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until December 30 for construction complete, including mechanical equipment and approaches, of the United States post office at St. Petersburg, Fla.

ELECTRIC WIRING.—Bids will be received until December 21 for construction of high and grade school building, including general construction, steam heating, electric wiring, plumbing, temperature regulation, etc., in Alton, Iowa, to cost about $35,000. Plans are being prepared by Beuttler & Arnold, architects.

REFRIGERATING EQUIPMENT.—Bids will be received at the office of the Port Commission of Seattle, Bell Street Warehouse, Seattle, Wash., until December 15, for construction of refrigerating and electrical equipment for east waterway terminal improvement of the port of Seattle. Plans and specifications are on file in the above office. C. E. Remsberg is secretary.

INCANDESCENT LAMPS.—The Commonwealth of Massachusetts has asked for sealed bids for about 50,000 incandescent electric lamps, all proposals to be on forms obtainable from Room 6, State House, Boston. Each bid must be accompanied by a check for $500 payable to order of the State Treasurer, and a $5,000 bond will be required for the faithful performance of contract. Bids will be received until December 16, at 12 noon, at Room 6, State House.

ELECTRIC ELEVATORS.—Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until December 23, for the installation, complete, of an electric passenger elevator in each of the following buildings: The United States post office and courthouse at Pendleton, Ore., the United States post office and courthouse at Brattleboro, Vt., and the United States post office and courthouse at Ardmore, Okla., in accordance with drawings and specifications, copies of which may be had on application to the Washington office.

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

NO. 19,383. ELECTRICAL MATERIAL, ETC.—An American consular officer in Spain reports that an electrical and machinery supply house desires to represent manufacturers of electrical material, such as motors, transformers, protective apparatus, centrifugal pumps, machine tools, brick-making machines, and electric automobiles. Interested firms should be prepared to negotiate along liberal lines of credit, and are requested to forward propositions and technical guarantees, together with catalogs fully describing goods and showing weights, dimensions, capacities, etc. Correspondence should be in Spanish.

NO. 19,385. ELECTRICAL SUPPLIES.—An American consular officer in China reports that a trade organization in Siberia desires to place a large order for carbons for street lamps using direct current; also switches, sockets, rosettes, plugs and meters. Samples, catalogs, price list and terms of sale are solicited.

NO. 19,412. MINING LOCOMOTIVES, ELECTRIC METERS, ETC.—A letter to the Bureau states that a business man in the Netherlands desires to be placed in touch with manufacturers of mining locomotives, electric meters, furnaces for smelting, hardening, etc., also furnaces fired by liquid fuel, boiler and engine mountings, gauges for all purposes, motor and automobile accessories, and all other articles needed in the mining industry, machine-building mills, etc.

ELECTRICAL APPARATUS AND SUPPLIES.—A prominent wholesale jobbing firm in Amsterdam, Holland, is prepared to act as agent for first-class American manufacturers of all kinds of electrical machinery, apparatus and supplies for light, power and telephone installations, who are willing to supply equipment suitable for the European market. The firm wishes catalogs, prices and full particulars. This is an exceptionally good opportunity. Address Claessen & Co., N. V., vh., Amsterdam, Netherlands.

NEW PUBLICATIONS.

DEPARTMENT OF COMMERCE.—The Bureau of Foreign and Domestic Commerce, Washington, D. C., has issued a catalog of bureau publications. These include reports of consuls and special agents.

FUELS.—The Bureau of Mines, Washington, D. C., has issued Technical Paper 123, entitled "Notes on the Use of Low-Grade Fuel in Europe," by R. H. Fernald. The fuels considered include wood refuse, tar, powdered fuel and coal high in ash.

BUREAU OF STANDARDS.—Vol. XII, No. 1, of the *Bulletin* of the Bureau of Standards, contains papers by R. L. Sanford on "Temperature Coefficient of Magnetic Permeability," and by F. Wenner, E. Weibel and F. B. Silsbee on "Methods of Measuring the Inductances of Low-Resistance Standards." No. 2 contains "Effective Resistance and Inductance of Iron and Bimetallic Wires," by John M. Miller, and "A Direct-Reading Device for Use in Computing Characteristics of Vacuum Tungsten Lamps," by J. F. Skogland.

NEW INCORPORATIONS.

LEXINGTON, KY.—The Fisher Electric Company has been incorporated with a capital of $4,000. by J. D. Susley, J. G. Fisher and others.

BOONEVILLE, ARK.—The Booneville Light and Power Company has been incorporated with a capital of $50,000. C. S. Greenway is president.

PENNINGTON GAP, VA.—The Electric Transmission Company has been incorporated with a capital of $100,000.

RICHMOND, ILL.—The Richmond Electric Company has been incorporated with a capital of $1,000, by Leslie Latimer, Phyllis L. Miller and others.

LAKE GENEVA, WIS.—The Southern Wisconsin Electric Company has been incorporated with a capital of $100,000, by John B. Sanborn, J. P. Alberg and others.

BROOKLYN, N. Y.—Primo Electrical Manufacturing Company, Inc. Capital, $5,000. Incorporators: C. P. Liotta, Rosario Morello and Sem S. Celano.

INDIANAPOLIS, IND.—Pratt Electric Company. Capital, $10,000; to buy and sell electrical fixtures. Incorporators: Henry F. Pratt, Allie T. Pratt, Edward W. Hohlt.

CHICAGO, ILL.—The Goodman Electric Construction Company has been incorporated with a capital stock of $10,000. The incoporators are: Lester E. Goodman, Ralph E. Stern and Harold J. Goldberger.

ROCHESTER, N. Y.—The Riverside Electric Company has been incorporated with a capital stock of $2,000 by N. K. Ward, Edwin L. North and Walter J. Moore.

NEW YORK, N. Y.—B. & R. Electrical Engineering and Construction Company, Inc. Electrical work of all kinds. Capital, $5,000. Incorporators: Morris Rothberg, Louis Bayer and Charles M. Glueck.

NEW YORK, N. Y.—Precision Radio Equipment Company, Inc., to manufacture electrical apparatus, etc. Capital, $5,000. Incorporators: Charles Horton, Samuel M. Levy and Simon H. Glass.

CHICAGO, ILL.—The Kantro Chandelier Company has incorporated with a capital stock of $2,500, to manufacture and deal in gas and electric fixtures and appliances. Harry W. Rosenblum, Samuel Spitzer and Mary Wolf are the incorporators. Z.

BRIDGEPORT, CONN.—A certificate of corporation has been filed in the office of the Secretary of State by the Ozark Construction Company. The concern is authorized to do a general contracting and electrical business and to distribute electricity. The authorized capital is $50,000, but business will begin with $1,000. The incorporators are James A. Byrne, C. C. Warren, Jr., and O. F. Ghrist of New York City.

FINANCIAL NOTES.

J. P. Morgan & Company have taken from the Interborough Rapid Transit Company $20,000,000 of the first and refunding-mortgage five-per-cent bonds, which is the balance of the $30,000,000 allotment. To date the bankers have taken from the company a total of $128,658,000 bonds, leaving approximately $27,000,000 to be taken. These are the bonds for the financing of the new subways and elevated lines.

Dividends.

	Term.	Rate.	Payable.
Ark. Val. Ry., Lt. & Pw., pf.	Q	1.75%	Dec. 15
Interstate Rys., pf.	S	3 %	Jan. 1
Muskogee Gas & Elec., pf.	Q	1.75%	Dec. 15
Standard Gas & Elec., pf.	Q	1 %	Dec. 15
United Lt. & Rys., first pf.	Q	1.5 %	Jan. 1

Reports of Earnings.

PUGET SOUND TRACTION, LIGHT & POWER.

	1915	1914
September gross	$ 609,782	$ 683,557
Net after taxes	222,207	283,633
Surplus after charges	39,384	105,816
Twelve months gross	7,690,015	8,623,412
Net after taxes	2,914,849	3,568,522
Surplus after charges	749,418	1,459,720

AURORA, ELGIN & CHICAGO.

	1915	1914
October gross	$ 167,521	$ 172,580
Net	65,122	56,152
Net atfer charges and taxes	23,844	16,669
Surplus after depreciation and amortization	19,134	13,743
Four months gross	713,318	783,790
Net	266,272	306,665
Net after charges and taxes	103,533	147,598
Surplus after depreciation and amortization	84,800	131,896

NORTHERN OHIO TRACTION & LIGHT.

	1915	1914
October gross	$ 339,599	$ 304,413
Net after taxes	133,350	113,426
Sulplus after charges	78,992	62,567
Balance, after preferred dividends	62,564	47,462
Ten months gross	3,168,960	3,032,972
Net after taxes	1,213,978	1,178,967
Surplus after charges	692,950	672,862
Balance after preferred dividends	529,465	522,325

TWIN CITY LINES.

	1915	1914
October gross	$ 806,542	$ 798,732
Net	317,810	325,389
Surplus after charges	175,882	193,977
Ten months gross	7,802,968	7,735,571
Net	2,782,844	2,945,928
Surplus after charges	1,448,242	1,647,804

MASSACHUSETTS ELECTRIC.

The Massachusetts Electric Companies issued its annual report, covering the year ended June 30, 1915. Comparison of the income account of the operating company with the previous year follows:

	1915	1914
Operating revenue	$9,538,406	$9,614,150
Operating expenses	6,897,751	6,427,863
Net operating revenue	2,640,654	3,186,289
Non-operating income	66,459	81,096
Charges	2,004,564	1,952,115
Net income	702,549	1,315,270
Dividends	677,846	1,242,069
Surplus for year	24,703	73,201
Previous surplus	213,532	212,850
Net profits and loss debentures	232,484	72,520
Surplus, June 30	5,751	213,532

MISSISSIPPI RIVER POWER.

	1915	1914
October gross	$ 139,033	$ 136,603
Net after taxes	115,529	107,059
Surplus after charges	9,306	17,088
Twelve months gross	1,630,982	.....
Net after taxes	1,289,219	.....
Surplus after charges	36,013	.....

THIRD AVENUE.

	1915	1914
October gross	$ 968,649	$ 949,430
Net after taxes	285,314	265,983
Other income	12,452	9,731
Total income	297,766	275,714
Surplus after charges	78,160	61,124
Four months gross	3,832,583	3,844,275
Net after taxes	1,227,527	1,218,875
Other income	34,062	31,436
Total income	1,261,589	1,250,311
Surplus after charges	404,175	396,674

PERSONAL MENTION.

MR. HENRY I. HARRIMAN, president of the Connecticut River Transmission Company, with headquarters in Boston, Mass., has been elected vice-president of the Boston Chamber of Commerce.

MR. ROBERT B. BASHAM, general contract agent of the Topeka (Kan.) Edison Company has been elected general manager of an electrical exhibition company which will hold an electric show in Topeka on January 17.

MR. J. J. KIRK, illuminating engineer of the Commonwealth Edison Company, Chicago, addressed the Chicago Section, Electric Vehicle Association of America, on December 7, on the subject of "The Nitrogen Lamp."

MR. H. K. LUGGER, local manager of the North Coast Power Company, Vancouver, Wash., formerly Washington-Oregon Corporation, has been made master of maintenance for the North Coast Power Company. Mr. Lugger will be succeeded by L. Clark.

MR. BENJAMIN B. LAWRENCE, a member of the class of 1878, has purchased the Pelton-Doble water wheel and the Pelton-Francis turbine, which were exhibited by the Pelton Water Wheel Company at the Panama-Pacific International Exposition, and presented these to the School of Mines, Columbia University, New York City.

MR. THOMAS J. CUSACK, for some time operator in charge of the operation of fire alarms in Brooklyn, has been appointed superintendent of operation of the fire-alarm system in all of the boroughs of New York City. Mr. Cusack has been in the telegraph service since 1877, being formerly connected with the Western Union Telegraph Company, Postal Telegraph-Cable Company, and other telegraphic organizations.

MR. PHILIP S. DODD has joined forces with the J. Walter Thompson Company, New York, N. Y., one of the largest expert advertising agencies in the country, where he will be in charge of special technical accounts. Mr. Dodd, who before entering the direct advertising field with the M. P. Gould Company, of New York, was connected for a long time with the electrical industry. For several years he was associated with the Electrical Review Publishing Company, Inc., later on holding the position of director of the Department of Publicity of the National Electric Lamp Association, Cleveland, O., and acting for over a year as secretary of the Society for Electrical Development, Inc., New York.

MR. JULIUS ANDRAE, head of the house of Julius Andrae & Sons Company, Milwaukee, Wis., celebrated his eighty-sixth birthday at his home on Beverly Road, East Milwaukee, on Thursday, December 2. Mr. Andrae was born in Meissen, Saxony, in 1829. When he had reached the age of 14 he began his apprenticeship to a locksmith. After traveling over Germany for several years he came to America and Milwaukee in 1855. On Sept. 22, 1856, he married Miss Marie Muelhauser. In 1859 he opened a little shop on West Water Street, which was the foundation of the large electrical firm which he now heads. Mr. Andrae refuses to retire from business and visits the present place of business on Michigan and Broadway twice or three times a week. The business is actively carried on by his sons.

MR. EDWARD N. LAKE, formerly in charge of the Chicago office of the Stone & Webster Engineering Corporation, has become a partner in the Krehbiel Company, engineers and constructors, with offices in the Marquette Building, Chicago. The business will be continued under the present firm name; Mr. Lake will be treasurer and manager, and Mr. Krehbiel will continue as president. Mr. Krehbiel has specialized in fuel, steam and mechanical engineering and construction. Mr. Lake has made electricity and its commercial applications his specialty. Both have been active in their respective lines for fifteen or twenty years. Both were connected with the Arnold Company and Bion J. Arnold for a number of years and are personal friends of long standing. Mr. Lake has also been connected in turn with the Western Electric Company, Chicago Edison Company and Board of Supervising Engineers. The Krehbiel Company is doing in smaller units the same kind of work that Stone & Webster, H. M. Bylesby & Company and J. G. White Companies have done in terms of millions.

OBITUARY.

MR. P. E. HUBER, founder and at one time manager of the Maschinenfabrik Oerlikon, died at Zürich, Switzerland, on October 4, at the age of 79.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES IN THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Dec. 6	Nov. 29
American Tel. & Tel. (New York)	128½	128½
Commonwealth Edison (Chicago)	144	143¾
Edison Electric Illuminating (Boston)	240	241
Electric Storage Battery, common (Philadelphia)	67	67
Electric Storage Battery, preferred (Philadelphia)	67	67
General Electric (New York)	176	176
Kings County Electric (New York)	125	125
Massachusetts Electric, common (Boston)	7	7
Massachusetts Electric, preferred stamped (Boston)	40	39
National Carbon, common (Chicago)	150	150
National Carbon, preferred (Chicago)	120	119¾
New England Telephone (Boston)	131	132
Philadelphia Electric (Philadelphia)	27⅝	27½
Postal Telegraph and Cables, common (New York)	80¼	80½
Postal Telegraph and Cables, preferred (New York)	65½	65
Western Union (New York)	87⅝	88
Westinghouse, preferred (New York)	76¼	—
Westinghouse, common (New York)	68¾	69¾

MR. T. BERLINER, manager of the Bergmann Electricity Works, Berlin, Germany, died on October 30, at the age of 65.

MR. THEODOR BRUGER, physicist of the Hartmann & Braun Aktien-Gesellschaft, Frankfurt, Germany, and well known for his work in developing electrical instruments, died on October 22. Mr. Bruger was 59 years of age.

MR. JOHN P. BOUNEY, president of the Thompson-Bouney Company, electrical contractors, of Brooklyn, N. Y., died on November 7, in that city after a brief illness. He was 42 years of age and a member of the local, state and national electrical contractors' associations.

MR. H. A. FISHER, who was recently appointed an assistant in the panelboard and switchboard departments of the New York territory of the Trumbull Electric Manufacturing Company, Plainville, Conn., died suddenly on November 26. Before his appointment to the New York office he had been connected with the company for about 12 years as foreman of the panel and switchboard departments.

MR. MALCOLM HARLOW BAKER, of East Braintree, Massachusetts, died suddenly, on November 27, at the age of 43 years. He was a graduate of the class of 1894, Lawrence Scientific School of Harvard University. Soon after he was associated with Frank Ridlon in the development of arc lamps and other electrical developments. He was with the Westinghouse Electric & Manufacturing Company in 1902 and 1903, and took a prominent part in the development of the reactance regulator. More recently he had been associated for some time with the American Flaming Arc Lamp Company.

DATES AHEAD.

American Association for the Advancement of Science. Annual meeting, Columbus, O., December 27-31. Secretary, L. O. Howard, Washington, D. C.

American Institute of Chemical Engineers. Winter meeting, Baltimore, Md., January 12-15, 1916. Secretary, J. C. Olson, Cooper Union, New York, N. Y.

Electrical Contractors' Association of Wisconsin. Annual convention, Hotel Wisconsin, Milwaukee, Wis., January 17-19, 1916. Secretary, Albert Petermann, 626 Lloyd Street, Milwaukee, Wis.

With the Electrical Manufacturers

The Globe Stove & Range Company, Kokomo, Ind., manufacturer of a fine line of electric stoves and ranges and other stoves, will hold its annual sales conference at the factory headquarters in Kokomo, during the week of December 13.

Wheeler Reflector Company, 156 Pearl Street, Boston, Mass., has issued Bulletin F, dealing with semi-indirect and pure indirect lighting fixtures. The reflectors for the former type are made either fluted or of the inverted hill and valley type. All reflectors are of white-porcelain-enameled steel. Several sizes and types are illustrated and briefly described.

The Terry Steam Turbine Company, Hartford, Conn., has issued Bulletin 20, dealing with the various types of Terry turbines. These are built for high, low or mixed pressures. Each type is illustrated and described, also applications, such as turbo-generator sets, turbo-pump sets and turbo-blower sets. The advantages of the Terry construction are clearly set forth. Copies of the bulletin can be had on request to the company.

The Mechanical Appliance Company, Milwaukee, Wis., has issued a booklet giving speeds and ratings of its motors for all classes of power circuits. In this are included the data for direct-current motors, two or three-phase motors for 60, 50, 40, 30 and 25 cycles, and single-phase motors for the corresponding frequencies. Data are also included on the various types of Watson ventilating fans driven by motors for various currents.

The Deane Steam Pump Company, 115 Broadway, New York, has issued Bulletin D184 on high-pressure hydraulic pumps. These are made for pumping water, oil or other liquids under pressures from 500 to 10,000 pounds per square inch and are used in many different industrial processes. Most of these pumps are multiplex; they are vertical or horizontal, and driven by motors or other prime movers. Auxiliaries, such as automatic bypass and check valves, are also described and illustrated in the bulletin.

Advance Electric Company, St. Louis, Mo., has issued Bulletin No. 12, describing and illustrating the "Advance" type WS, single-phase, constant-speed motors. These motors start as repulsion motors and, after accelerating to nearly full speed, automatically change to induction motors through the action of a very simple, rugged and reliable short-circuiting device. They are made in sizes from one-eighth to five horsepower and for 60 and 25-cycle circuits. A general description of this type motor was published in our issue of September 18, 1915.

National Metal Molding Company, Pittsburgh, Pa., manufacturer of electrical conduits and fittings, is distributing an attractive wall hanger, reproducing, in one-half actual size, the conduit charts as adopted and recommended by the National Electrical Contractors' Association. They show the sizes of conduit required by the National Electrical Code for carrying various sizes of conductors. This hanger is printed on linen-backed stock and will prove of convenience for reference in the offices of architects, engineers and electrical contractors. A copy will be furnished upon request of the company.

Western Electric Company, Incorporated, has changed its Detroit headquarters from 263 Franklin Street to the new building at Kirby and Dequindre Streets. The change has been occasioned by a steady business growth which reached proportions whereby the old location became inadequate. The new building is two stories high and has a frontage of 150 feet and a depth of 130 feet adjoining the Grand Trunk Railway in the section that forms a part of the inner belt railway of Detroit. The total floor space is 50,000 square feet, and the yard, with an area of 54,000 square feet, is large enough to accommodate stocks of crossarms, clay conduit and poles. The new building is strictly up to date, with every appliance to facilitate quick handling of merchandise.

Westinghouse Lamp Company, 1261 Broadway, New York City, has issued a booklet on store lighting that is entitled "A Simple but Important Problem." It deals with the lighting of the store interior, show case, display window and electric signs. Suggestions on proper lighting are exemplified by illustrations of good and poor installations. Incandescent lamp development is discussed and data given on Westinghouse Mazda lamps of the various types suitable for store and sign lighting. The booklet is well written and illustrated. It should prove of great interest to merchants in giving them in condensed form a knowledge of the best methods of store, window and sign lighting. Copies of the booklet can be obtained on application to the company.

Frank Adam Electric Company, 904-914 Pine Street, St. Louis, Mo., has issued Catalog No. 2, covering its line of Reflectolytes. These are semi-indirect lighting fixtures incorporating a reflecting surface above the lamp with a diffusing bowl around and below the lamp. The units are made in four sizes, ranging from 12 to 24 inches diameter of the reflecting surface. About the latter is a more or less ornamental ring. The whole unit is mounted directly at or close to the ceiling or suspended by chains to meet requirements. Quite a variety of designs is shown in the catalog, also details of construction, photometric and illumination curves. Engineering data are given on the selection of the proper units for different illumination requirements. The Frank Adam Electric Company has found that the manufacture and sale of Reflectolytes has grown to such dimensions as to make it advisable to turn

this over entirely to a subsidiary company, **The Reflectolyte Company.**

Western Electric Company announces that on November 18 all of the assets of the Western Electric Company, the old Illinois corporation, were acquired by transfer to a new company chartered under the laws of the State of New York, to be known as **Western Electric Company, Incorporated.** The stockholders of the Western Electric Company came to the conclusion that it was desirable that the company should have two classes of stock, common and non-voting preferred. As the statutes of Illinois do not provide for such classifications, it was decided that the company should change its legal domicile. No change in the policies, operations, or management of the company is involved. The same board of directors and officers still continue. Western Electric Company, Incorporated, under the laws of New York will have $15,000,000 of six-per-cent cumulative preferred stock, and 150,000 shares of common stock at no par value, but with $5 paid in, making a total of $750,000.

The Bryant Electric Company, Bridgeport, Conn., has just secured from its printers its 1916 catalog of wiring devices. This is very handsomely gotten up and consists of 168 pages, which is said to make it the largest catalog covering this type of electrical equipment ever published. A unique feature is a simple thumb index by means of which the 30 odd parts of the catalog can be readily located. The catalog covers the full range of Bryant and Perkins devices, including sockets, receptacles, attachment plugs, wall, surface and knife switches, cutout bases and fuses, rosettes, etc. Each device is illustrated and the ratio of the illustration to the actual full size is given. In the case of the several lines of sockets and receptacles the interchangeable feature is neatly shown to give a good idea of the great variety of caps and bases available for any type body. Six pages of wiring diagrams near the back of the book will be found of much value. Dimension classifications cover 10 pages. The last eight pages are devoted to a double index; the first index gives catalog numbers, page number, list prices, discount schedule, standard package and carton. The final index is a general index by the names of the devices.

Record of Electrical Patents

Issued by the United States Patent Office, November 30, 1915.

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,161,837. Switch for Automatic Telephone Systems. W. M. Bruce, Jr., assignor to International Automatic Telephone Co., Springfield, O. Arrangement of contacts and wipers in automatic switch.

1,161,840. Electric-Lighting Device. C. E. Campbell, Lynn, Mass., assignor of one-half to F. R. Campbell. Combined transformer and lamp bulb.

1,161,850. Paper-Feed-Controlling System. A. F. Dixon, assignor to Western Electric Co., New York, N. Y. Electromagnetic, step-by-step feed controlled by paper.

1,161,854. Calling Device. O. F. Forsberg, assignor to Western Electric Co. Mechanism of impulse-sending call box.

1,161,856. Telephone Receiver. S. P. Grace and R. A. L. Snyder, Pittsburgh, Pa. Combination of permanent and electromagnets actuating diaphragm-operating armature.

1,161,863. House Telephone Set. R. R. Ireland and A. F. F. Gilson, assignors to Western Electric Co. Includes outlet box with cover plate for wall mounting and jack for plugging in hand set.

1,161,869. Mail-Handling Apparatus. G. E. Kerns, Archer City, Tex. For delivering mail to moving trains; automatic electric car moves alongside main track and may be releasably secured to mail car.

1,161,874. Telephone-Exchange System. W. H. Matthies, assignor to Western Electric Co. Arrangement of contact terminals in telephone selector switch.

1,161,884. Terminal Bank. J. N. Reynolds, assignor to Western Electric Co. Arrangement of contact terminals in telephone selector switch.

1,161,890. Permutation Alarm and Circuit-Closer for Sparking Plugs. P. Rousey, Brooklyn, N. Y. Special structure of switch.

1,161,905. Bearing for Fast-Running Wheels. F. A. Stewart, assignor of one-half to W. Ellis, Hamilton, Ont., Can. Special axle, lubrication and contacting device for trolley wheels.

1,161,929. Telegraphy. P. B. Delany, assignor to Telepost Co., New York, N. Y. Polarity system with tape sender.

1,161,932. Automatic Control of Machinery. D. Du Bois, assignor to Crocker-Wheeler Co., Ampere, N. J. Automatic control of motor current on reverse; current is shut off if speed exceeds high or low limits.

1,161,939. Submarine Lighting. B. B. Lewis, Bridgeport, Conn. Lamp fixture for attachment to ship's side.

1,161,988. Apparatus for Winding Armature Coils. J. C. Simonsen, assignor to Chalmers Motor Co., Detroit, Mich. Structure of collapsible mandrel.

1,161,989. Insulating Fabric. C. E. Skinner, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Fireproof; consists of metal foil with hard, heat-resisting, insulating coating.

1,161,993. Liquid Rheostat. H. A. Steen, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Electrode plates divided into sections which are selectively connected in circuit.

1,161,994. Over-Speed Protecting Device for Electric Motors. N. W. Storer, assignor to Westinghouse Electric & Mfg. Co. Operation of multi-voltage controller governed by motor speed.

1,162,007. Substation Message-Register. J. A. Wotton, assignor to Western Electric Co. For telephone stations.

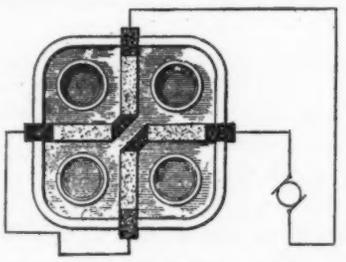
1,162,012. Receiver-Supporting Arm. W. R. Armor and L. A. Young, Denver, Colo. Telephone receiver carried on extension arm secured to pedestal.

1,162,020. Fire-Alarm. W. H. Bowman, Bridgeport, Conn. Telephone receiver hook lifted by spring plunger normally restrained by fuse.

1,162,031. Electrode-Adjusting Means. D. E. Carpenter, assignor to Westinghouse Electric & Mfg. Co. Windings and connections of electrode-actuating motor in vapor rectifier.

1,162,043. Electric Locomotive. G. M. Eaton, assignor to Westinghouse Electric & Mfg. Co. Spring connections between journal boxes and frame permit universal relative movement.

1,162,049. Thermoelectric Generator. E. Garretson and E. W. Schlenker, Buffalo, N. Y. Compact, unitary structure of thermopile in casing for temperature indication.



No. 1,162,179.—Electric Furnace.

1,162,056. Circuit-Controller. F. W. Harris, assignor to Westinghouse Electric & Mfg. Co. Drum type; has delayed automatic return to "off" position.

1,162,069. Telephone System. K. S. Johnson, assignor to Western Electric Co. Connections of transmitter, receiver and bell in subscriber's set.

1,162,070. Means or Apparatus for Cleaning Tinned Plates. M. L. Jones, Neath, Wales, assignor of one-third each to J. M. Fells and to W. H. Patchell. Plates magnetically held to conveying rolls.

1,162,071. Automatic Temperature-Controlling System. S. N. Jordan, Lowell, Mass. Circuit arrangements for thermostatic control of valve-operating motor.

1,162,073. Current-Interrupter. C. F. Kettering, assignor to Dayton Engineering Laboratories Co., Dayton, O. Special structure of electromagnetic vibrator for engine ignition.

1,162,076. Electric Switch. C. J. Klein, assignor to Cutler-Hammer Mfg. Co. Pendent device has two superposed, push-button switch mechanisms.

1,162,083. Automatic Train-Controlling Device. A. F. Lacey and W. J. Clingenpeel, Des Moines, Iowa; said Clingenpeel assignor to P. Pappas. Electromagnetic mechanism for controlling air train line according to position of signal along trackway and speed of train.

1,162,106. Wiring Mechanism for Automobile Engines. I. H. Sare, Sentinel, Okla. Manner of supporting cable and distributing and connecting wires.

1,162,139. Reflector for Incandescent Lamps. M. Claussen and W. A. McKay, assignors to Wizard Electric Lamp Co., San Francisco, Cal. Hemispherical reflector attached to bulb.

1,162,149. Process of Making Wear-Withstanding Coat. E. A. Eckhardt, Philadelphia, Pa. Iron or steel phonograph needles hardened by alloying with tungsten, vapor of which is passed to needle through arc.

1,162,159. Message-Delivery System. O. W. Hart, Fall River, Mass. Telephone memorandum device at one station has the delivery of the memorandum controlled from another station.

1,162,167. Combination Plug and Pilot Light. J. A. Hunt, Pleasanton, Cal. Lamp indicating presence or absence of potential contained in casing secured to attachment plug.

1,162,174. Electromagnetic Regulator. A. Krauss, assignor to firm of Robert Bosch, Stuttgart, Germany. Unitary structure of electromagnetically controlled compression resistance.

1,162,175. Trolley Wheel. F. Leadbeater, Detroit, Mich. Lubricating provisions.

1,162,178 and 1,162,179. Electric Furnace. J. M. Lohr and H. W. Gillett, Ithaca, N. Y. First patent: heat conserved by arranging heating elements to radiate directly to crucibles and indirectly to casing. Second patent: modification. (See cut.)

1,162,196. Dynamo Mounting. W. I. Thomson, assignor to Safety Car Heating & Lighting Co., Newark, N. J. Special structure for suspending car-lighting dynamo.

1,162,198. Handle for Illuminating Diagnosis and Surgical Instruments. R. H. Wappler, assignor to American Cystoscope Makers, Inc., New York, N. Y. Comprises socket for receiving lamp and variable resistance.

1,162,202. Phonograph. C. Agner, Jr., Philadelphia, Pa. Opening of cover lights lamp on sound arm, illuminating needle and record.

1,162,212. Process and Apparatus for Preparing Beverages, and Products Produced Thereby. J. E. Bloom, Brooklyn, N. Y. Liquid is subjected to action of absorption material while in an electrified state.

1,162,213. Process and Apparatus for the Electrical Treatment of Liquids and Fluids, and the Products Resulting Therefrom. J. E. Bloom. Modification of above.

1,162,224. Lock for Automobiles. P. Cyr, Boston, Mass., assignor of one-half to W. J. Downey. Electric contacting device requires predetermined combination of operations similar to combination lock.

1,162,263. Circuit-Closer for Electric Clocks. O. M. Todd, Toppenish, Wash. Adapted to be intermittently opened by swinging of pendulum.

1,162,267. Apparatus for Recording and Duplicating Music-Notes. E. C. Weissmiller, Los Angeles, Cal. Perforating machine for recording piano music has punches controlled electrically by piano keys.

1,162,279. Organ Stop Mechanism. B. G. Austin, assignor to Austin Organ Co., Hartford, Conn. Electromagnetically operated.

1,162,285. Coated Phonograph-Stylus and Other Article. E. A. Eckhardt. Product of process of patent No. 1,162,149.

1,162,287. Flashlight. E. Grah, Toledo, O. Adapted for mounting directly on terminals of dry cell, throwing light endwise of cell.

1,162,288. Lantern. E. Grah. Above modified to throw light laterally of cell.

1,162,294. Wire-Supporting Pole. R. Lichtenberger, New Harmony, Ind. Built-up metal structure.

1,162,309. Electric Starting Device for Internal-Combustion Engines. L. Renault, Billancourt, France. Flywheel normally disconnected from engine is driven by starting motor and then centrifugally disconnected from motor and connected to engine.

1,162,339. Method of Making Composite Metal Bodies. W. D. Coolidge, assignor to General Electric Co., Schenectady, N. Y. Manner of uniting tungsten and copper.

1,162,340. Method of Uniting Metals. W. D. Coolidge, assignor to General Electric Co. Manner of promoting the adhesion or wetting of molten copper to the surface of a body of tungsten.

1,162,341 and 1,162,342. Composite Metal Body. W. D. Coolidge, assignor to General Electric Co. First patent: X-ray target having body of cast, homogeneous copper and a facing of wrought tungsten. Second patent: ductile tungsten having an adherent coating of an incorrodible alloy, largely gold.

1,162,354. Connecting Device. H. A. Hart, Hartford, Conn. Plug and receptacle have quartered threads and plug has two parallel threads of same pitch as receptacle thread.

1,162,355. Electric-Lamp Lock. J. O. Hebble, Lancaster, Pa., and F. H. Humphrevill, Atlantic City, N. J.; said Hebble assignor to said Humphrevill. Key-operated flexible ring with teeth, is mounted on socket to grip lamp stem.

1,162,361. Electric Switch. P. A. Huddleston, Oklahoma City, Okla. Details of multiple switch.

1,162,363. Electric Heater. H. H. Ingersoll, assignor to Ingersoll Electric Vaporizer Co., Chicago, Ill. Details of casing, coil, etc., of flexible heating pad.

1,162,370. Friction Brake. S. H. Keefer, assignor to Niles-Bement-Pond Co., Jersey City, N. J. Electromagnet mounted in motor casing controls connection of shaft with brake.

1,162,372. Motor. J. C. Kersteter, assignor to Minneapolis Heat Regulator Co., Minneapolis, Minn. Operation of motor electromagnetically controlled by thermostat.

1,162,377. Vehicle Signaling Device. C. C. McColgan, Baltimore, Md. Tail structure has light for license plate, and has direction plate with doors for covering last, an audible signal indicating when doors are closed.

1,162,394. Adjustable Portable Electric-Light Support or Base. J. L. Power, Trenton, N. J. Socket pipe is adjustable along slot in support or transversely thereto.

1,162,397. Manufacture of Rubber Articles. R. B. Price, assignor to Rubber Regenerating Co., Mishawaka, Ind. Electrically heated apparatus for vulcanizing tires.

1,162,400. Shade-Holder. A. C. Recker, assignor to Waterbury Mfg. Co., Waterbury, Conn. Details of device for attachment to lamp socket.

1,162,405. System of Distribution. E. O. Schweitzer, Chicago, Ill. Variable and constant-voltage devices connected with a source are connected by an asymmetric connection, preventing transfer of energy from circuit of constant-voltage device to circuit of variable-voltage device.

1,162,415. Process of and Apparatus for Producing Ozone. J. Steynis, Bay Shore, N. Y. Refrigerating apparatus is provided for drying and cooling the air.

1,162,419. Motion-Picture Camera. C. Van Deventer, Chicago, Ill. Means for discharging static electricity from the film.

1,162,424. Electric-Light-Bath Apparatus. B. Wiener, Chicago, Ill. Mounting of incandescent lamps in frame extending about body of patient.

1,162,433. Combined Phonographic and Motion-Picture Apparatus for Producing Indexed Synchronous Records. E. H. Amet, Redondo Beach, Cal. Magnetic film marker and telephone receiver acting on phonograph produce signals in unison on film and record when circuit is closed.

1,162,437. Device for Protecting Structures from Lightning-Strokes. W. Bajohr, St. Louis, Mo. Details of lightning rod for chimneys, etc.

1,162,442. Vehicle Signal Apparatus. B. L. Bobroff, Milwaukke, Wis. Electromagnetically operated direction indicator.

1,162,447. Electric-Motor Device. W. H. Bristol, assignor to Bristol Co., Waterbury, Conn. Electric-motor-operated clock train.

1,162,449. Battery. C. F. Burgess, assignor to C. F. Burgess Laboratories, Madison, Wis. Dry battery has depolarizing mixture of impalpable graphite with manganese depolarizer.

1,162,458. Electric Regulator. J. L. Creveling, assignor to Safety Car Heating & Lighting Co. Gearing for varying compression resistance.

1,162,459 and 1,162,460. Electric Regulation. J. L. Creveling, assignor to Safety Car Heating & Lighting Co. First patent: special means for governing a voltage regulator, comprising compression resistance with means for preventing sudden changes in the regulator. Second patent: voltage control of generator in storage-battery system.

1,162,468. Magnetic Apparatus for Railways. A. H. Fox, New York, N. Y. For controlling apparatus on car from track side; magnet on car is attracted or repelled by controlling polarity of track magnet.

1,162,469. Circuit-Closer for Hot-Water Heaters. C. A. Cox, Chicago, Ill. Heating circuit opened by expansion of mercury subjected to water heated.

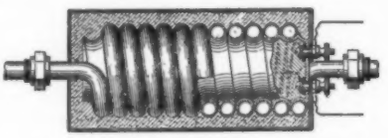
1,162,472. Reel. B. H. Gedge, Anderson, Ind., and B. H. Gedge, Jr., Cleveland, O. Winding reel is electromagnetically controlled and is magnetized to grip material supplied to it.

1,162,475. Measuring Apparatus. G. H. Gibson, Montclair, N. J. Instrument for comparing the rates of flow through two pipes has indicator acted on by two coils, respectively energized by current proportional to the fluid flow in the conduits.

1,162,482 and 1,162,483. Dynamo-Electric Machine. F. I. Hiss, Jr., assignor to Westinghouse Electric & Mfg. Co. First patent: special structure and location of series field coils. Second patent: modification.

1,162,490. Thermo-Hydrostat. E. M. Jones, Adrian, Mich. Water supply to a vaporizer associated with a heater electrically controlled by joint operation of wet and dry thermostats.

1,162,493. Rotor for Dynamo-Electric Machines. A. Kingsbury, assignor to Westinghouse Electric & Mfg. Co. Special laminated structure for rotating fields reducing the section and weight as the shaft is receded from, and equalizing stresses.



No. 1,162,537.—Electric Gas-Heater.

1,162,504. Bowl-Hanger for Electric Lights. L. G. Mitchell and G. H. Norquist, assignors of one-third to C. Lundgren, Omaha, Nebr. Special structure of chain-supported frame for indirect fixture.

1,162,506. Voltage-Regulator for Electric Generators. A. H. Olmstead, Bowdon, England. Special structure of contact arms, etc., in electromagnetic vibratory contact regulator.

1,162,514. Controlling Apparatus for Electrical Switching Systems. J. N. Reynolds, assignor to Western Electric Co. Switch device has plunger which alternately engages contact sets of a pair when repeatedly depressed.

1,162,516. Electric Time Switch. K. F. Richmond, London, Eng. Flow of fluid to one side of tilted vessel to break circuit, is retarded by porous diaphragm.

1,162,518. Centrifugal Switch. H. M. Scheibe, assignor to Westinghouse Electric & Mfg. Co. Special structure for mounting on rotor of ceiling fan motor.

1,162,521. Magneto. J. E. Sheriff, assignor to J. Takamine, New York, N. Y. Structure having permanent magnet, coil, pole pieces and vibratory armature co-operating with the last, rotating together.

1,162,537. Compressed-Gas Heater. J. J. Yeager, Sheridan, Wyo. Gas coil wound on electrically heated core. (See cut.)

1,162,541. Electrical Switch. J. L. Adams, Jr., assignor to Westinghouse Electric & Mfg. Co. Centrifugally operated.

1,162,553. Current-Distributing Apparatus. C. N. Bergmann, Pittsburgh, Pa., assignor of one-half to C. Schuster, Bellevue, Pa. Arrangement of switch interconnecting buses on switchboard.

1,162,556. Automatic Telephone-Exchange System. G. A. Betulander and N. G. Palmgren, assignors to Betulander Automatic Telephone Co., London, England. Arrangement of intermediate junction lines for connecting incoming lines with lines of outgoing groups.

1,162,571. Contact Device. L. W. Chubb, assignor to Westinghouse Electric & Mfg. Co. Special arrangement of spring contacts in contact-making and breaking device.

1,162,593. Gyroscopic Transmission Apparatus. J. Fleux, Harfleur, France. Gyroscopic power transmission element has flywheel electrically driven.

1,162,614. Armored, Flat, Electrical Conductor. M. Kallman, deceased; P. Kallman, Berlin, Germany, administratrix. Resilient metallic strip has nonconducting, adhesive coating in which conductor is embedded.

1,162,646. Signal Apparatus. W. K. Porter, Pittsburgh, Pa. Control of permanent or flashing multicolored signal.

1,162,656. Recording Device. W. W. Salmon and F. L. Dodgson, assignors to General Railway Signal Co., Gates, N. Y. Records when a second train enters an occupied block.

1,162,667. Transformer Pole. E. O. Schweitzer. Hollow metal pole supporting line wires contains oil-immersed transformer in its base.

1,162,659. Spark Gap. J. E. Seeley, assignor to Vulcan Coil Co., Los Angeles, Cal. Structure of terminals with special heat-radiating provision.

1,162,665. Electric Switch. A. J. Tizley, assignor to E. F. Caldwell & Co., New York, N. Y. Rotary switch mounted in tube supporting single lamp in imitation of candle.

1,162,666. Printing Camera. J. Trimbach, Rye, N. Y. Electric light mounted on wall of extensible light chamber.

1,162,695. Motor for Operating Railway Signals. W. K. Howe, assignor to General Railway Signal Co. Armature and field poles have registering slots and armature is moved or stopped by varying current.

1,162,699. Device for Indicating Liquid-Levels at a Distance. S. Q. Kline, Jr., Washington, D. C. Float-controlled electric circuit actuates indicator at a distance.

1,162,701. Check-Controlled Mechanism. L. J. LePontois, assignor to American Multinola Co., Cleveland, O. Motor circuit initially closed by check is later closed independently thereof.

1,162,719. Water Siren. H. Hecht, Kiel, Germany. Resistance of driving motor circuit is varied to maintain constant speed.

1,162,726. Magneto. A. H. Neuland, San Francisco, Cal. Structure of rotating flux valve and co-operating pole-pieces.

1,162,735. Snap Switch. H. K. Ely, Baltimore, Md. Special structure of push-button-operated, rotary snap switch.

Reissue 14023. Photographic-Printing Apparatus. A. S. Howell, assignor to Bell & Howell Company, Chicago, Ill. Original No. 1,056,794, dated March 25, 1913. Electric circuit for motor and light automatically controlled by film and light-admission gate.

Patents Expired.

The following United States electrical patents expired on December 6, 1915:

615,346. Electric Battery. O. T. Bugg, Jr., New York, N. Y.

615,265. Alternating - Current Dynamo-Electric Machine. S. Z. de Ferranti, Hollinwood, England.

615,292. Electric Battery. M. Maas, New York, N. Y.

615,344. Telephone. F. Burger and H. M. Williams, Fort Wayne, Ind.

615,347. Electric Switch. W. Ely, Providence, R. I.

615,349. Electric Cable Conductor. S. D. Field, Stockbridge, Mass.

615,351. Dynamo-Electric Machine. J. E. Fuller, New York, N. Y.

615,365. Electrical Appliance for Elevators. J. H. Roberts, Grand Rapids, Mich.

615,369. Ore Stamp. D. M. Smyth and J. E. Smyth, Pasadena, Cal.

615,388. Apparatus for Operating Electric Switches. C. Hartdegen, Newark, N. J.

615,395. Circuit-Breaker. F. A. La Roche, New York, N. Y.

615,407 and 615,408. Electric Arc Lamp. M. S. Okun, New York, N. Y.

615,418. Automatic Rheostat. E. T. Wilkinson, Philadelphia, Pa.

615,419. Rheostat. C. Wirt, Philadelphia, Pa.

615,420. Electrical Connection. W. E. Baker, Chicago, Ill.

615,471. Reflector. A. E. Boeschenstein, St. Louis, Mo.

615,539 to 615,541. Electric Battery. P. A. Emanuel, Aiken, S. C.

615,584. Block-Signal System. W. L. Stockton, Trenton, O.

615,592. Electric Locomotive. M. E. Thomas, Cassaday, Ky.

615,594. Electric Locomotive and Truck. S. M. Vauclain, Philadelphia, Pa.

615,652. High-Frequency Apparatus. T. B. Kinraide, Boston, Mass.

615,653. High-Frequency Induction Apparatus. T. B. Kinraide.